American Machinist

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Tools for Transmissions—Chevrolet has one inspector for every nine production workers in the newly revamped Saginaw plant (Page 780).

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Volume 81 — Number 18

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New developments in

metals
alloys
cutting alloys
welding
heat treating
finishing

See our

NATIONAL METAL EXPOSITION NUMBER

The great National Metal Congress and Exposition opens its doors at Atlantic City on October 18. During that week, thousands of production executives of metal-working plants will visit the Show and attend the meetings of the five big engineering societies sponsoring it. This is the biggest event of the year in metals and metal treatment.

Since last year there have been many new developments, some of which may hold attractive possibilities for you. You owe it to yourself to "canvass" this Show thoroughly for your *own* benefit.

Here is a whole issue of American Machinist devoted to the Show. The editors will pack the issue with practical information for you . . . exhibitors . . . program . . . new developments exhibited . . . major articles on metals, heat treating, welding, metal finishing, etc.

If you are planning to go, you can select from this issue the exhibits that you "must see". If you cannot go, it provides the next best thing . . . the *Show in Print.*

Coming on October 6

EDITORIAL

Styled for Today

FOR SIXTY YEARS American Machinist has been coming regularly to the men who run the machine shops and metal-working plants of the world. Few indeed are the charter subscribers and the other early readers who remember what it looked like in its infancy. Like the machines of that day it sported garlands and curlycues of adornment that look silly to us now when we run across an old machine or turn up a magazine of the President Grant era.

But such flowery ornamentation was in the spirit of the times. Times change, and with them type styles and fashions in magazine layout. In keeping with the times the editors and publishers of American Machinist have continued to adapt its appearance to the taste of each period. Now, on its sixtieth birthday, it has been restyled by a master of typography and comes to its readers, the same faithful friend and servant of three score years, but easier to read, more attractively dressed and enlarged in content.

The new type is slightly larger than the old and also more legible. It is in keeping with the dignity of a business paper with sixty years of success behind it, but it is also modern enough to be readily adjustable to the requirements of present day artistic layout.

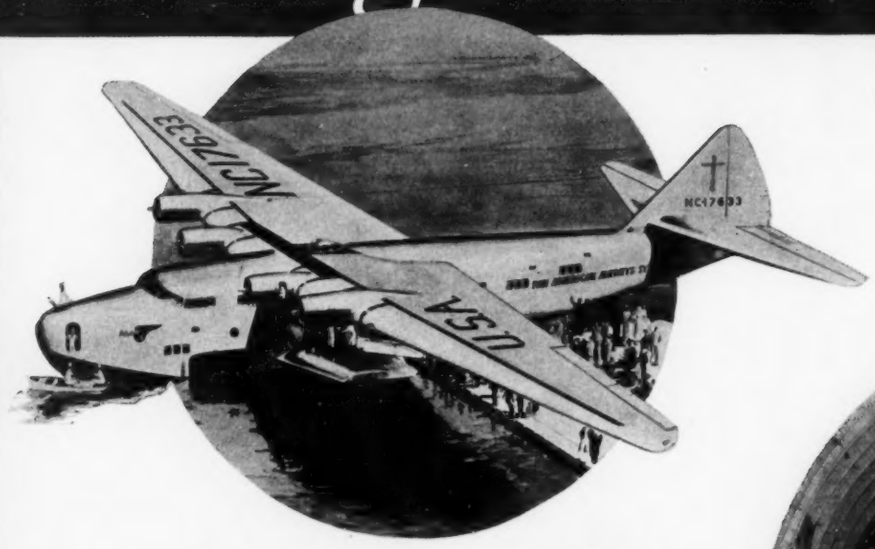
All of the regular features that have made the paper invaluable to various types of readers are being continued and improved. Some of them have been moved from old positions to new ones that make for better continuity in the reading matter.

One or two innovations are being made, others will come along a bit later. The principal changes are a condensation of the news pages and an expansion of the space allotted to technical and practical articles.

AMERICAN MACHINIST has never been a static paper. It could not be and continue to serve so dynamic an industry as the metal-working industry. Its editors and publishers have given careful thought to the style that is adopted in this number and they believe that their readers will like it. But they propose to change this style just as soon as it becomes clear that it has served its purpose and should be superseded, whether that time be six months or six years hence.

VOLUME 81 • AMERICAN MACHINIST, ESTABLISHED 1877 • K. H. CONDIT, F. H. COLVIN, EDITORS • NUMBER 18

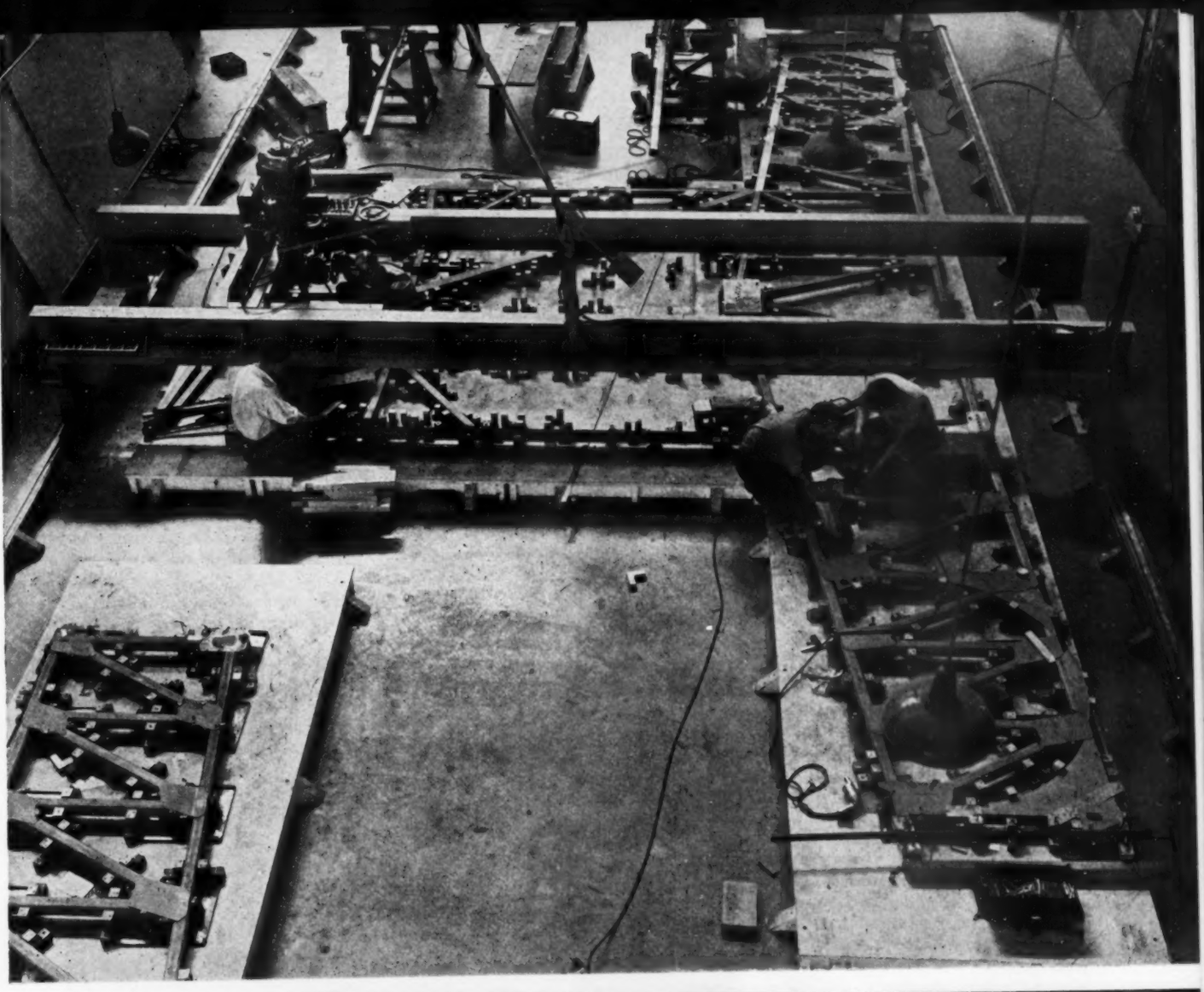
Boeing Builds Clippers



Boeing Aircraft Company, Seattle, is building six of these clippers for Pan American Airways to carry 75 day passengers, 40 at night

Workmen with portable tools assembling one of four engine nacelles each of which supports a 1500-hp. Wright Cyclone engine. These nacelles are as large as the fuselage of an ordinary small plane

A wing spar for one side of the 152-ft. wing. The riveted structure is made of high strength aluminum alloy. The wing is so designed that the engine crew can get through it to each of the four engines to make adjustments while in flight



Section being assembled and drilled in floor jigs. Note the drilling rig that travels on tracks fastened to the floor. Hull framework at left, wing spar center section at right

Moving the hull center section into place. This view gives a good idea of the type of welded steel jig and of the maze of scaffolding needed in assembly

Where Does Labor Go From Here?

"Labor at the Cross-roads," a drama for which "stirring" is too mild a word, is getting ready for the second act

FRANK RISING
Labor Editor, Business Week *and* American Machinist

TO THE more-or-less bewildered average citizens in the audience, the first act of "Labor at the Cross-roads" contained enough excitement to do for a complete play. Whether John L. Lewis was the hero or the villain seemed to be a matter which divided the spectators; he drew terrific applause from the gallery while the boxes and choice seats down front were tossing tomatoes at him.

Shrewd Thespians that they are, Mr. Lewis and his supporters have realized that the final scene of Act I, with armed workers, armed employers, police, vigilantes, and government locked in battle, didn't please. In fact, there were many spectators who insisted that there really should be no second act.

But there the analogy ends. Organized labor is preparing for the next phase, and indications are that the coming months may see development of more reason, less riot. Much can be seen in the revision of sentiment on all sides to support this view. Salient developments, evident to impartial observers, are coming into focus in this wise:

1. American Federation of Labor and Committee for Industrial Organization people are working in concert in certain places, while conciliation moves between some of the top-ranking members of the two big groups continue.

2. C.I.O. policy of rushing the gates in force, to gain every last ounce of advantage from the exuberant "ever victorious" psychology of early organizers, ended with the Midwest steel setback and has been replaced by a far saner, long-term philosophy of careful groundwork in organizing, request for court procedure in cases of alleged illegal acts by employers, demands for plant elections if findings support the union claims and thus give it prestige.

Acme

William Green, A. F. of L. leader, plagued by jurisdictional fights

3. National Labor Relations Board offices have been settling more cases without letting them get into the headlines, which indicates that employers and employees alike are adopting a spirit of compromise.

4. Employers, by and large still pretty skittish, have stopped r'aring long enough to take a good look at the new machine which appeared on the road and which may not mean their lives, after all.

5. In some of the smaller plants, and in one or two larger ones, independent unions have been formed by the employees. Many of them have taken out state charters. What will eventually happen to them remains to be seen.

All of these developments are heartening to those who hope that cooperation can displace distrust and angry suspicion. And perhaps the most important movement, in all its implications, is the trend toward peace between A. F. of L. and C.I.O.

The recruits of the two organizations are so much alike, in thinking, in expression, and in aim, that continued cleavage is difficult to sustain on any basis other than a political one. It should not be forgotten that quite a number of top men, particu-

larly in the A. F. of L., are not Democrats nor even New Dealers. Some of them are Republicans, some anti-New Deal men. Consequently it is only natural that there should be a division in the political thinking and steering of labor by the leaders, and it is only natural that conservative or progressive sentiments should incline one man to support one political group, another to throw his weight to the other side.

Just how far labor will get into politics, and politics get into labor, no one can say with certainty, but it is reasonable to expect a continued shifting of political labels among former "Democrats" or "Republicans" in organized labor just as the labels are being blurred in other walks of life.

Organized labor, however, does not have to be of one mind, nor to have every man vote alike on election day, in order to maintain an unbroken front. The A. F. of L. proved this for many years. Therefore, it is not reasonable to expect national political differences to keep the A. F. of L. and C.I.O. apart. Business men will not know for sure, however, whether another full year of intramural rivalry between labor factions is to come, until the A. F. of L. convention in Denver a few weeks hence. There, the executive council will reaffirm its undying determination to fight the C.I.O. or will soften its policy; there the membership will vote to sustain a combative spirit or to adopt more conciliatory methods.

From the C.I.O. standpoint, the change must come in the A. F. of L. The C.I.O. is on record as making only one condition to peace: Recognition by the A. F. of L. of the merits of the minority report in the convention of 1935, supporting industrial unionism in mass industries.

C.I.O. More Cautious

Meanwhile, the average employer is heartened by the definite change in policy and planning in C.I.O. The top leaders now think more of the "long pull" tactic than of slam-bang assault. Concrete evidence of this change is found in the Weirton Steel hearings of recent weeks, where the S.W.O.C. lay back to wait for orderly court procedure to give it standing, before making its demands for recognition, election and contracts.

Other evidences are found in the clamping down of discipline in the automobile unions, the Sidney Hillman order of "no rough stuff" in the textile drives, and the more cautious and thoughtful actions of organizers and executives in other fields. All of this is having a good effect on the majority of the rank and file, and a saddening effect on the "radical fringe."

The labor board, too, is thoughtful these days. It has liberalized its rules on elections, by permitting ship lines to list a blank space on the ballot where an employee may vote for "no union of any kind." And its work for conciliation without strikes is bearing fruit in many places.

The war is not over, by any means, nor is peace and quiet to prevail for long. Labor is coming up strong after the dog days, ready again for new attacks on plants it has failed to storm previously. Just how long the period of quiet is to prevail is a matter of conjecture—it depends on the tempo of business, political strategies, public sentiment, even such things as the weather. Everybody needed a rest, and nearly everybody got one after the steel strike. But the tide of labor is still flowing strongly, even if not in a tidal wave.

The present period, more or less, is inventory time. After the first tremendous surge of unionization under the C.I.O., wherein organized labor just about doubled its membership (from 3,500,000 to around 6,600,000) both C.I.O. and A. F. of L. found themselves with a mass of "freshmen" on their hands. Like all greenhorns, the new unionists can't learn what it is all about in a few weeks, nor for that matter in a few months. They have to learn the value of discipline, they have to learn that labor hasn't suddenly become management, and that "rights" are held by both parties. If the labor unions can make good members out of their new joiners in a couple of years they will be doing a notable job.

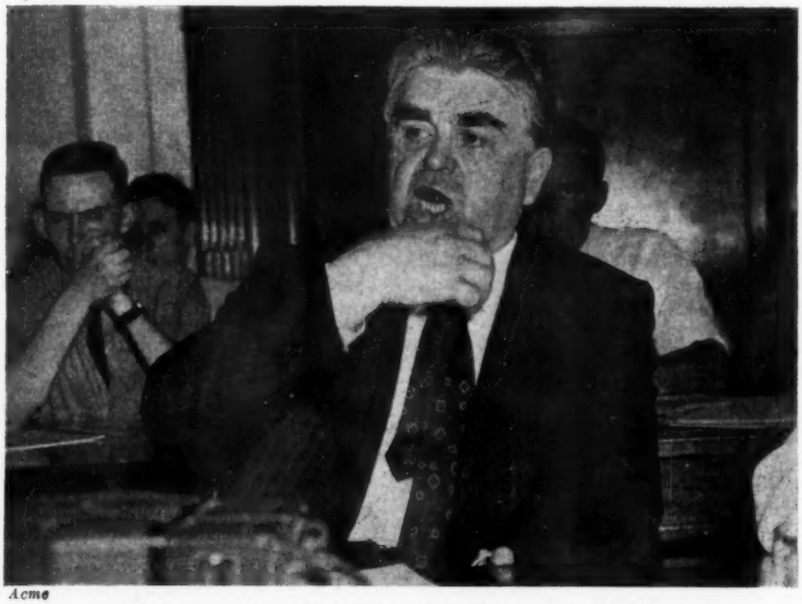
Holding the Half-Hearted

Still another problem, of great moment to any new union, is the half-convinced joiner who loses heart if "trouble with the boss" is prolonged. When a strike is called, the new unionist takes this as a sign that the union is powerful, but if settlement is delayed and he begins to suffer he wants to get back to work.

Thus, the "back-to-work" movements in the Midwest steel strikes cut the "pledged" members away from the union at a rapid rate, and the recent job of bringing them back into the fold has been a very difficult one. Then, too, the maintenance of picket lines has been a hard task.

Over and above these problems, the unions—both C.I.O. and A. F. of L.—are keeping their headquarters busy day and night trying to take care of the mechanical job of placing them all in reasonable alliance. The big federations have to keep at their bookkeeping, establish well-managed offices, make the house over to twice its size so that twice the family can find room to live in it. And the problem of jurisdiction increases as the expansion goes on.

From all of which may be seen the value of the "marking time" period, to labor. The unions needed to catch their breath just as much as the rest of us did.



Acme

John Lewis, C.I.O. chief, bothered by hot-headed radical aides

Wrestling With The Social Security Act

By cutting to the core of its requirements, one concern has set up a procedure that does the job of making Federal and State returns as painless as possible

HANNS GRAMM
Department of Industrial Relations, Textile Machine Works

WHEN the chimes ringing in 1937 had died down, industrial relations managers, personnel directors and controllers found themselves confronted with the task of actually setting in motion within their respective concerns the machinery for administration of the Federal Social Security Act and the companionate state acts. Theoretical discussion vanished with January 1 and the individual executive found himself snowed under by an avalanche of news releases, information sheets, poorly mimeographed dispatches from Federal and State authorities, sales pamphlets from service agencies and bulletins from trade and professional associations. These required, requested, proposed or advised one thing or the other, but resulted only in making a complicated matter still more so. In desperation the responsible executive asked himself two questions: First, what definite requirements must our concern meet under the Federal and State Acts? Second, what is the most efficient and most economical method to accomplish the required end in our particular situation?

A Big Job

Our concern is engaged in machine manufacturing and employs 2,500 people. Compliance with Social Security regulations appeared to be a large undertaking. After a careful study of the acts in connection with the commentaries issued by a reliable service agency, a committee was formed under the direction of the Industrial Relations Department. On this committee are represented: Finance Department, Bookkeeping Department, Time Office and Tabulating Department. The purpose of this committee is to serve as a clearing agency on all questions pertinent to the application of the Federal Social Security Act and the Pennsylvania State Unemployment Compensation Law. It keeps in touch with social security regulations, contacts outside agencies for their points of view and methods, prepares briefs on questions and audits the work done by the clerical force.

One Clerk Assigned

This committee stated that no new and special department need be established for the administration of the Social Security Act, but that ways and means should be devised to achieve the desired end by smooth cooperation between the already existing departments. For this purpose, and assuming that the administration of the Social Security Act and similar laws would call for well-trained men in the future, a young clerk was selected as a special aid to the head of the Department of Industrial Relations and designated to become a specialist on this work. He was relieved from other duties and soon developed into the key man for all questions pertinent to social security legislation.

His first task was to establish a reliable calendar of social security tax returns (Federal and State) for the present calendar year. The next step was to devise the most practical and most economical way of collecting, from the various departments involved, the data required by these reports. To this end inter-plant blanks were devised, also a check list of the various requirements prescribed by the act in case a man becomes 65 years of age or dies. (In order to save space, only blanks for Old-Age Benefit figures are reproduced, those for Unemployment returns are omitted.)

It was found that certain of the forms furnished by the State authorities were unsuitable for use in our tabulating machines. Permission was obtained for our concern to redesign and print at its own expense blanks which would allow more economical use of the tabulating machinery.

Questions That Arose

The inter-plant machinery for the administration of the Act thus established, the committee was kept busy with clarification of problems which presented themselves during the course of the work. Such questions were, for example:

Whether an attorney employed part-time as a legal advisor is to be considered an employee or an independent contractor relative to the taxes imposed under Title VIII of the Social Security Act.

Whether tuition fees paid for apprentices who attend a trade school constitute wages or not.

Whether amounts paid as a reward for suggestions made by employees are taxable or not.

These are a few of the issues which arose and were settled by correspondence or personal interviews

SOCIAL SECURITY TAX RETURNS CALENDAR FOR 1937

Last Date for Filing Report	Period Covered by Report	Name of Report
Feb. 28	Jan. 1, 1936—Dec. 31, 1936 inclusive	Return on Form 940 of Federal tax imposed by Title IX of the Social Security Act.
		First installment of Federal tax imposed by Title IX of the Social Security Act, if tax is paid in installments.
		Payment of complete Federal tax imposed by Title IX of the Social Security Act, unless employer has selected to pay tax in four installments.
		Employer's Contribution Return on Form UC-2—Pennsylvania.
	Jan. 1, 1937—Jan. 31, 1937 inclusive	Return on Form SS-1 and payment of Old-Age Benefits tax for January, imposed by Title VIII of the Social Security Act.
Mar. 31	Feb. 1—Feb. 28 inclusive	Return on Form SS-1 and payment of Old-Age Benefits tax for February, imposed by Title VIII of the Social Security Act.
April 30	March 1—March 31	Return on Form SS-1 and payment of Old-Age Benefits tax for March, imposed by Title VIII of the Social Security Act.
		Second installment of Federal tax imposed by Title IX of the Social Security Act, if tax is paid in installments.
May 31	Apr. 1—Apr. 30 inclusive	Return on Form SS-1 and payment of Old-Age Benefits tax for April, imposed by Title VIII of the Social Security Act.
June 1	Jan. 1—March 31	Employer's Contribution Return on Form UC-2—Pennsylvania.
		Employer's Quarterly Report of wages payable to each employee—1st Quarter—Form UC-2a—Pennsylvania
		Employer's Quarterly Summary Report of Wages payable—1st Quarter—Form UC-2s summary—Pennsylvania.
June 30	May 1—May 31 inclusive	Return on Form SS-1 and payment of Old-Age Benefits tax for May, imposed by Title VIII of the Social Security Act.
July 31	June 1—June 30 inclusive	Return on Form SS-1 and payment of Old-Age Benefits tax for June, imposed by Title VIII of the Social Security Act.
		Third installment of Federal tax imposed by Title IX of the Social Security Act, if tax is paid in installments.
	Jan. 1—June 30 inclusive	Information returns required by Title VIII of the Social Security Act on Form SS-2 and SS-2a.
	Apr. 1—June 30 inclusive	Employer's Contribution Return on Form UC-2—Pennsylvania.
July 31	Apr. 1—June 30 inclusive	Employer's Quarterly Report of Wages payable to each employee—2nd Quarter—Form UC-2a—Pennsylvania.
		Employer's Quarterly Summary Report of wages payable—2nd Quarter—Form UC-2s summary—Pennsylvania.
Aug. 31	July 1—July 31 inclusive	Return on Form SS-1 and payment of Old-Age Benefits tax for July, imposed by Title VIII of the Social Security Act.
Sept. 30	Aug. 1—Aug. 31 inclusive	Return on Form SS-1 and payment of Old-Age Benefits tax for August, imposed by Title VIII of the Social Security Act.
Oct. 31	Sept. 1—Sept. 30 inclusive	Return on Form SS-1 and payment of Old-Age Benefits tax for September, imposed by Title VIII of the Social Security Act.
		Fourth installment of Federal tax imposed by Title IX of the Social Security Act, if tax is paid in installments.
	July 1—Sept.	Information return required by Title VIII of the Social Security Act on Form SS-2 and SS-2a.
		Employer's Contribution Return on Form UC-2—Pennsylvania.
		Employer's Quarterly Report of wages payable to each employee—3rd. Quarter—Form UC-2a—Pennsylvania.
		Employer's Quarterly Summary Report of wages payable—3rd Quarter—Form UC-2s summary—Pennsylvania.
Nov. 30	Oct. 1—Oct. 31 inclusive	Return on Form SS-1 and payment of Old-Age Benefits tax for October, imposed by Title VIII of the Social Security Act.
Dec. 31	Nov. 1—Nov. 30 inclusive	Return on Form SS-1 and payment of Old-Age Benefits tax for November, imposed by Title VIII of the Social Security Act.

IMMEDIATE REPORTS

15 days after employee attains age 65 or dies.		Employer's Information Return under Title VIII of the Social Security Act for an employee who attains age 65 or dies—Form SS-3—also necessary affidavits.
Date business was started	At time employer starts business	Employer's Application for Identification number—Form SS-4—for new employers.
Immediate	At time employee was added to payroll	U. S. Social Security Act Application for Account Number—Form SS-5—for new employees who do not have account numbers.
Immediate		Statement of Employer—Form OAC-1001—for employees attaining age 65.
	Monday following week employee was removed from payroll. Starting Oct. 1, 1937.	Employee's separation notice—Form UC-2b—Pennsylvania.
	Monday following week employee was added to payroll. Starting Oct. 1, 1937.	Employee's engagement notice—Form UC-2c—Pennsylvania.
Date business was started	At time employer starts in business	Employer's First Statement—Form UC-1—Pennsylvania.

OLD AGE BENEFIT TAX FIGURES
For the Month of Work Sheet

I. REMUNERATION

1. Report on Gross Wages by Tabulating Department—see attached statement.....
2. Report on Gross Wages paid to Employees through Drawing Accounts by Salary Payroll Department—see attached statement.....
3. Report on Gross Wages paid to Employees through Commissions by Salary Payroll Department—see attached statement.....
4. Report on Gross Wages paid to Apprentices (in form of Apprenticeship bonus) by Bookkeeping Department—see attached statement.....
5. Report on Gross Wages paid to Apprentices (in form of Apprentices tuition payment) by Bookkeeping Department—see attached statement.....
6. Report on Gross Wages paid (special wages—bonus) by Salary Payroll Department—see attached statement.....

TOTAL GROSS WAGES PAID DURING MONTH OF.....

II. DEDUCTIONS ALLOWABLE

Wages paid to employees reaching age limit (65 years) or salary limit ($3,000) or in exempted employments:

a. From Tabulating Dept. report attached.....
b. From Drawing Account report attached.....
c. From Commission report attached.....
d. From Bonus report attached.....

TOTAL DEDUCTIONS ALLOWABLE ON GROSS WAGES.....
TOTAL TAXABLE WAGES PAID TO EMPLOYEES.....

III. COMPUTATION OF TAX:

Employer's Tax.....
Total Amount of Employee Contributions—see statement.....
Total Amount of Taxes Due (Amount of Check).....
Total Number of Employees to Whom Taxable Wages were paid.....

GROSS WAGES TABULATION

Please return to Secretary of Social Security Committee, Dept. of Industrial Rlations, not later than.....

Week Ending	Total Gross Wages Paid To Employees	Amount Paid To Employees Reaching Age Limit (65 Yrs.) or Salary Limit ($3,000) or Other Exempted Employees	Total Taxable Wages Paid to Employees	Total Amount of Employee Contributions

TOTAL FOR PERIOD.....

Total Number of Employees to Whom Taxable Wages Were Paid.....

Note: Any wages paid that were not included in the above, such as May Bonus, Vacation Bonus, Christmas Bonus, etc., kindly attach a separate statement.

FEDERAL OLD-AGE BENEFITS INFORMATION
for Period.....

Please return to Secretary of S. S. Committee, Dept. of Industrial Relations.

SALARY PAYROLL DEPARTMENT

(A) *Drawing Accounts:*
1. Total amount paid to employees.....
2. Amount paid to employees reaching age limit (65 yrs.) or salary limit ($3,000).....
3. Amount of employee contributions.....

(B) *Commissions:*
1. Total amount paid to employees.....
2. Amount paid to employees reaching age limit (65 yrs.) or salary limit ($3,000).....
3. Amount of employee contributions.....

(C) *Bonus:*
1. Total amount paid to employees.....
2. Amount paid to employees reaching age limit (65 yrs.) or salary limit ($3,000).....
3. Amount of employee contributions.....

BOOKKEEPING DEPARTMENT

(D) *Apprenticeship Bonus:*
1. Total amount paid to employees.....
2. Amount of employee contributions.....

(E) Apprentice Tuition Payments (T.M.W. to W.P.I.).....
(F) General ledger balance of Federal S.S. Act employee contributions.....

with Federal and State authorities. It is a pleasure to state that in all these cases we met with the most friendly reception from official agencies and were given a full opportunity to state our side of the problem.

It is perhaps too early to draw a final conclusion, but from the first seven months of operation it appears that the system evolved in our plant works satisfactorily. By utilizing the existing channels in our organization we have been able to administer the Social Security Act with considerably less expense than was originally anticipated.

PROCEDURE WHEN EMPLOYEE ATTAINS AGE 65

Employer Must

1. Fill in and file form SS-3 with the district Collector of Internal Revenue.
2. Fill in and attach Affidavit A (affidavit by employee) to form SS-3. To be filled in by the employment department. The employee must be asked to sign the affidavit before our notary public who can administer the necessary oath.
3. Fill in and attach Affidavit B (affidavit be filled in by the employment department and signed by the employment manager or assistant employment manager. To be notarized.
4. Fill in and return form OAC-1001 to local Social Security Board.
5. Instruct the employee to go to the local Social Security Board in order to make his application for a lump sum payment under the Social Security Act (Federal Old-Age Benefits Section). To be instructed by employment department.

PROCEDURE WHEN EMPLOYEE DIES

Employer Must

1. Fill in and file form SS-3 with the district Collector of Internal Revenue.
2. Fill in and return form OAC-1001 to local Social Security Board.

Solution for Marking Steel

A formula for a solution for marking steel, to be used in place of the usual copper sulphate solution, has been developed by Glenn L. Martin Aircraft Company. This formula, as reported in a recent issue of the *"Do-All" Digest,* published by Continental Machine Specialties, Inc., is made as follows: dissolve one level tablespoonful of Aniline Violet Merck (Gentian Violet B) in a small quantity of white denatured alcohol. Add this to one-third gallon of white shellac and two-thirds gallon of white denatured alcohol.

SECTIONAL TENDER TRUCK FRAMES

FRANK C. HUDSON

TRUCK frame design has changed in many ways and these changes are reflected in the machining methods used. Figs. 1 and 2 show the machining of parts of a side frame for a Norfolk & Western tender truck frame, each part being a steel casting. The bottom surface of the rounded end at the left of the part shown in Fig. 1, rests in a pocket in the end of the piece seen in Fig. 2. The walls of this pocket carry the trunnions, that are being turned with a sweep tool, on each side of the casting.

Returning to Fig. 1 we see the facing of a flat surface at the end to which one of the outer journal boxes is bolted. The second part in Fig. 2 has two such surfaces, neither of which have as yet been machined. One of these flat surfaces is beneath the trunnion at the left.

This sectional method of construction changes the problems of maintenance. It makes it possible to have spare parts all machined ready for use and also to recondition worn parts by the use of the building up process with the arc welder or torch. Worn bolt holes are filled so they can be re-drilled to standard size. Worn surfaces are treated in a similar manner. And, being comparatively small, the various parts can be handled without difficulty on standard machines. Practically all of the work necessary can be done on frame slotters, or plain slotters, and on the radial drilling machine.

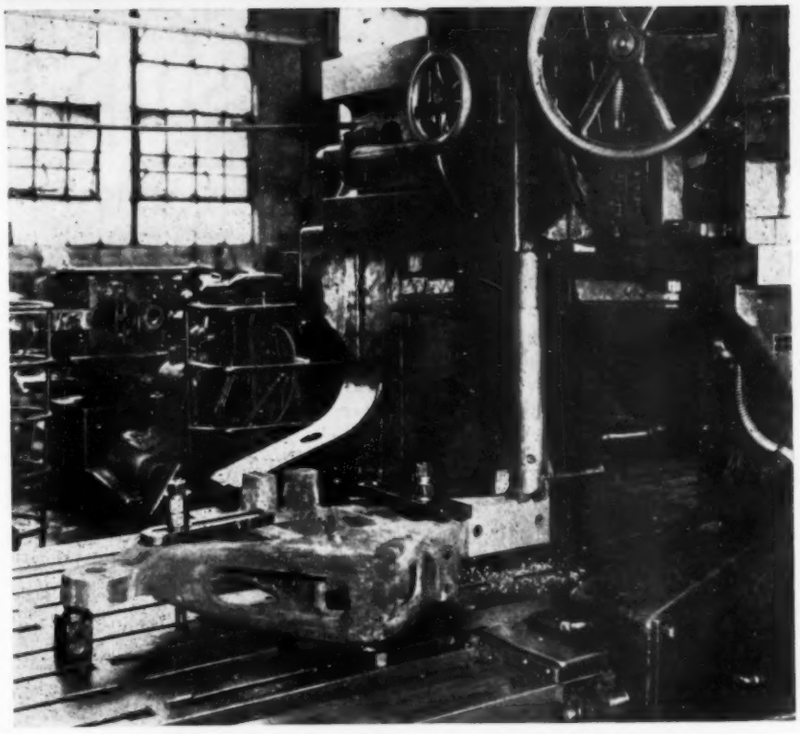


Fig. 1—Sectional truck-frame components allow simple set-ups on usual railroad shop equipment. Here a facing operation is being done on a slotter

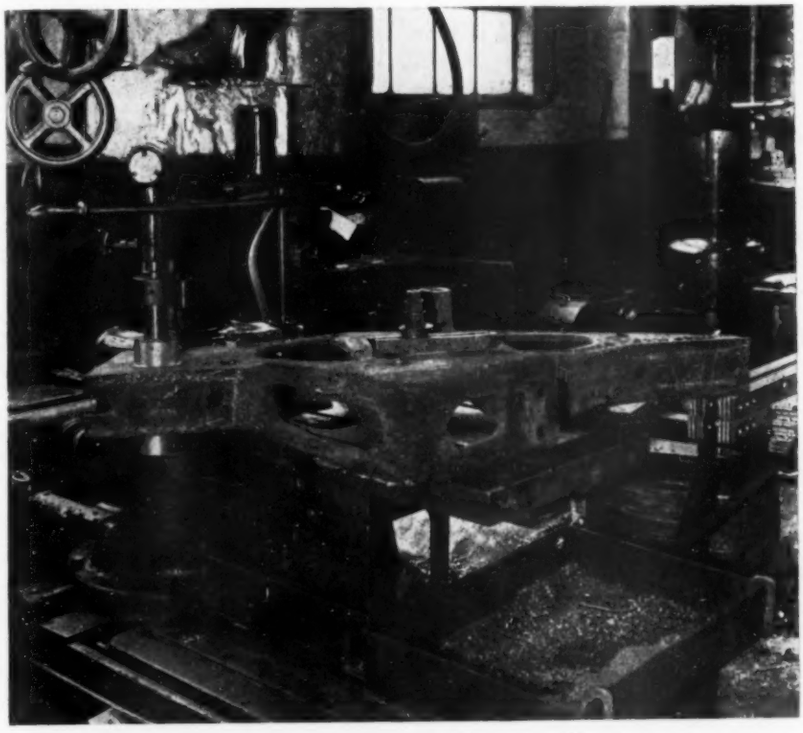


Fig. 2—The other frame component is just as readily set up on a radial drill for turning the trunnions with a sweep tool

Apprenticeship by Mail

Correspondence courses supplement shop work in Waterbury–Farrel's training program

THE TRAINING of apprentices is no new departure for the Waterbury-Farrel Foundry & Machine Company. In the office of W. T. Bannon, who is in direct charge of the apprentice training program, hangs the copy of an agreement entered into by the company and an apprentice, dated August 11, 1874. The present program, however, dates back to 1926. At that time, as now, there existed a shortage of skilled labor. Convinced that a practical and permanent method of coping with the situation must be developed, a survey of the then existing industrial apprentice training programs was made. The men employed for this purpose spent three months traveling over a broad area between Lynn, Massachusetts, and St. Louis, Missouri, calling on every plant that was doing, or had done, anything in the field of apprentice training.

The program organized in 1926 on the basis of this survey, is fundamentally the program in effect today. During the depression years the program was sharply contracted but never entirely eliminated.

63 Apprentices in Training

As this is being written, 63 appentices are being trained for one of five trades—machinists, wood pattern makers, iron molders, machine blacksmiths and draftsmen. The entire teaching staff consists of only one person. That one man finds it possible to provide technical instruction for 63 apprentices in five trades is because of a change made in the method of conducting the program soon after it was inaugurated in 1926.

At first the apprentice supervisor attempted to develop his own text material for the various trades to be taught. However, he soon discovered that he had undertaken a task virtually impossible for one man. He could not be a technical expert in several unrelated fields, could not keep such texts up-to-date and at the same time conduct the program. Either suitable text material must be obtained from some outside source, or several technical men must assist him as instructors in the conduct of classes. The necessary assortment of texts, catalogs, handbooks and trade papers repeated some information and omitted other needed technical information, and could not be arranged in a satisfactory sequence from elementary through advanced stages. Furthermore, by the class method there must be enough boys taught a given trade at one time to make the organization and the conduct of a class economical. This would mean ten or fifteen for each trade, but often a given shop could not start that many apprentices at the same time or so large a single group entering the trade at one time would arouse the resentment of the foreman concerned.

The problem was solved by entering into an agreement for the organized use of the instruction service of the International Correspondence Schools. This has lifted a heavy burden of detail from the shoulders of the supervisor, leaving him free to give each apprentice individual attention which has been a leading factor in the success of the program.

The selection of boys to be enrolled as apprentices is based upon a personal interview, a physical examination, and two written tests—the one a general intelligence test; the other, the Stenquist Mechanical Aptitude Test. Eighteen is the minimum age for enrollment. The company insists on a high school education only for its draftsman apprentices, but the completion of four years in high school is a point in any applicant's favor. Each candidate for an apprenticeship is told that if he is taken on as an apprentice he will be expected to enroll and pay for an I.C.S. course. The apprentice supervisor determines who is to be enrolled, and when; also, the course to be studied.

The length of the apprenticeship is 8,000 hours and normally requires three years. The 8,000 hours is divided into nine periods. The first 300 hours is a probationary period during which any who are obviously unfit are weeded out. The second period is of 700 hours, while the remaining seven periods are of 1,000 hours each. Three hours per week are spent in a study room within the plant for directed study. Apprentices are paid for the time spent in the classroom as well as for the time spent in the shop. At the end of each successfully completed period, they receive an increase in hourly rate.

Bonuses Paid

At the end of every thirteen weeks, if their marks are high enough and their work in the shop is satisfactory, the apprentices receive a bonus which practically covers the expenditure for the I.C.S. course. As a further incentive to good work it is possible for an apprentice to earn premium time—in other words, to reduce the numbers of hours to be spent in completing his time. In this way, the total number of hours can be cut from 8,000 to 7,650. When an apprentice finishes both his shop practice and course and is ready to take his place as a journeyman in the plant, he receives a bonus of $100.

Both a study room in the plant and a completely equipped training shop are provided. While at work in the shop the apprentices are engaged in actual production. Their output must meet the rigid inspection standard applied to all of the company's products. Each group of apprentices work with a journeyman who watches the work being done and is prepared to give any necessary help. Each job on which journeymen and apprentices are working together is in charge of a sub-foreman, while a general foreman is in charge of the training shop as a whole. As a result of this system, on the average the company is able

to get production from its apprentices that compares favorably with the work of experienced journeymen, considering the stage of each young man's training, his individual skill and job intelligence.

One of the most important features of the training program is its adaptability to the individual learning abilities of each apprentice. Because of the directed use of the instruction service, each apprentice is enrolled individually and each can proceed with his course as fast as he and the supervisor feel that he is prepared to do so. Each one works in the study room independently of all the others. The slower learners do not act as a drag on the more gifted ones. The quick learner can go ahead as fast as his capabilities and application permit. New apprentices can be started any time, without regard to the length of time the others may have been indentured, and without waiting until there are "enough to organize a class" in any given trade. For instance, from July, 1936 to March, 1937, the number of apprentices enrolled at different periods was as follows:

July 23, 1936	3 boys
October 15, 1936..	2 "
February 4, 1937..	8 "
February 5, 1937..	2 "
March 19, 1937...10	"
March 24, 1937 ..	1 boy

The flexibility of the program provides for another element that is of the greatest importance in the success of an apprentice training program. The fact that each apprentice can study as an individual, without regard either to the rate of progress of others or the subjects which they are studying at the time, makes possible a correlation between the technical instruction and the apprentice's work in the shop. The boys working on the lathe, the planer or the shaper can be given the texts that specifically apply to their work in the shop. When one or all of them are ready to move on to another machine, they are supplied with the texts which apply to the new machine.

Training Draftsmen

The training of potential draftsmen presents a special problem. Here the procedure differs to some extent from that followed in the other trades. The length of the training period is 8,000 hours. A high school education and some aptitude for drawing are pre-requisite qualifications. When an applicant is hired, he is immediately placed in the drafting room for the probationary period of 300 hours. If his progress is satisfactory during this period, and if it continues to be satisfactory, he is kept in the drafting room for a year and a half.

Then the apprentice draftsman is placed in the training shop for a period to obtain practical experience. The work in the shop gives him an understanding of the uses and limitations of machine tools in relation to the design. It eliminates the possible loss in material, time and temper that frequently occurs when the shop receives the product of a draftsman who lacks the background of such first-hand experience.

Some employers excuse themselves for not conducting an apprentice program, saying that after an apprentice has spent two or three years in training he may decide to take himself and his acquired skill and trade knowledge to some other employer. Careful selection measures, a reasonable wage rate and good working conditions are, of course, the obvious preventatives against any large-scale migration of this character. Also, the whole-hearted moral support of the management, the active helpfulness of participating foremen and mechanics, and the character and work of the apprentice supervisor play a very important part in reducing such losses to a minimum. The experience of this company indicates that the possibility of losing apprentices at the conclusion of their training period need not be a serious factor. Since 1934, only two of the young men have gone elsewhere.

Three hours of directed study per week is the only class-room work required

Modern Transmissions From a Modern Plant

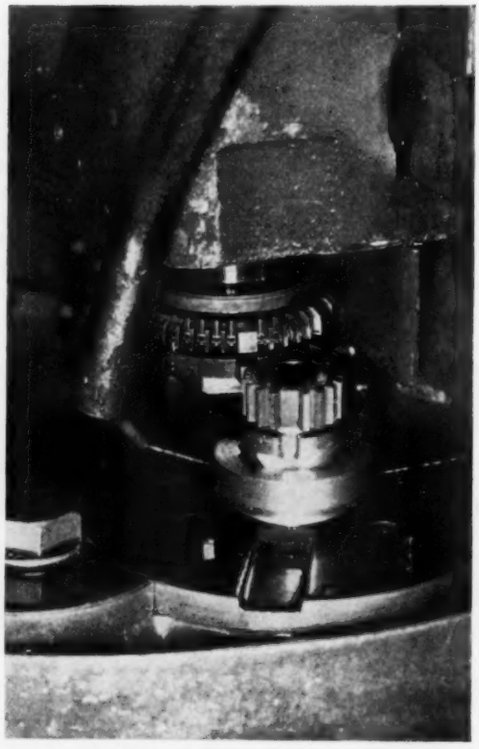
High-lights of Chevrolet's practice at its Saginaw parts division show effective use of the latest standard and special machine tools

BURNHAM FINNEY
Western Editor

ABOUT a year ago the Chevrolet Division of General Motors Corporation began operations in its new parts-manufacturing division at Saginaw, Mich. Plant 1, which daily turns out twelve carloads of transmissions for Chevrolet passenger cars and trucks, formerly was the old Saginaw Products crankshaft factory of General Motors and was completely renovated, remodeled and re-equipped with modern machine tools for its present production. Plant 2, which is entirely new, houses the forge division and the bumper division. This article is confined to a description of some of the operations in connection with transmission manufacture.

There are 118 different parts in every Chevrolet transmission. Over 56,000,000 parts are made annually in Plant 1 at Saginaw by a working force of 1,500 men. The green-gear division consists of seven departments in which the following transmission parts are machined: counter-gear, first and reverse gear, reverse idler gear, mainshaft, second- and third-speed clutch, drive gear and second-speed gear. Chain conveyors and chutes carry parts to and from the various operations.

From the green-gear division, parts move by conveyor to Plant 2 for heat-treatment. After heat-treatment, they are returned to Plant 1 for finish grinding. The shaft holes are ground and bronze bushings pressed into the gears. These bushings then are diamond bored. Washing, inspection, testing and matching of gears in a sound-proof room follow.



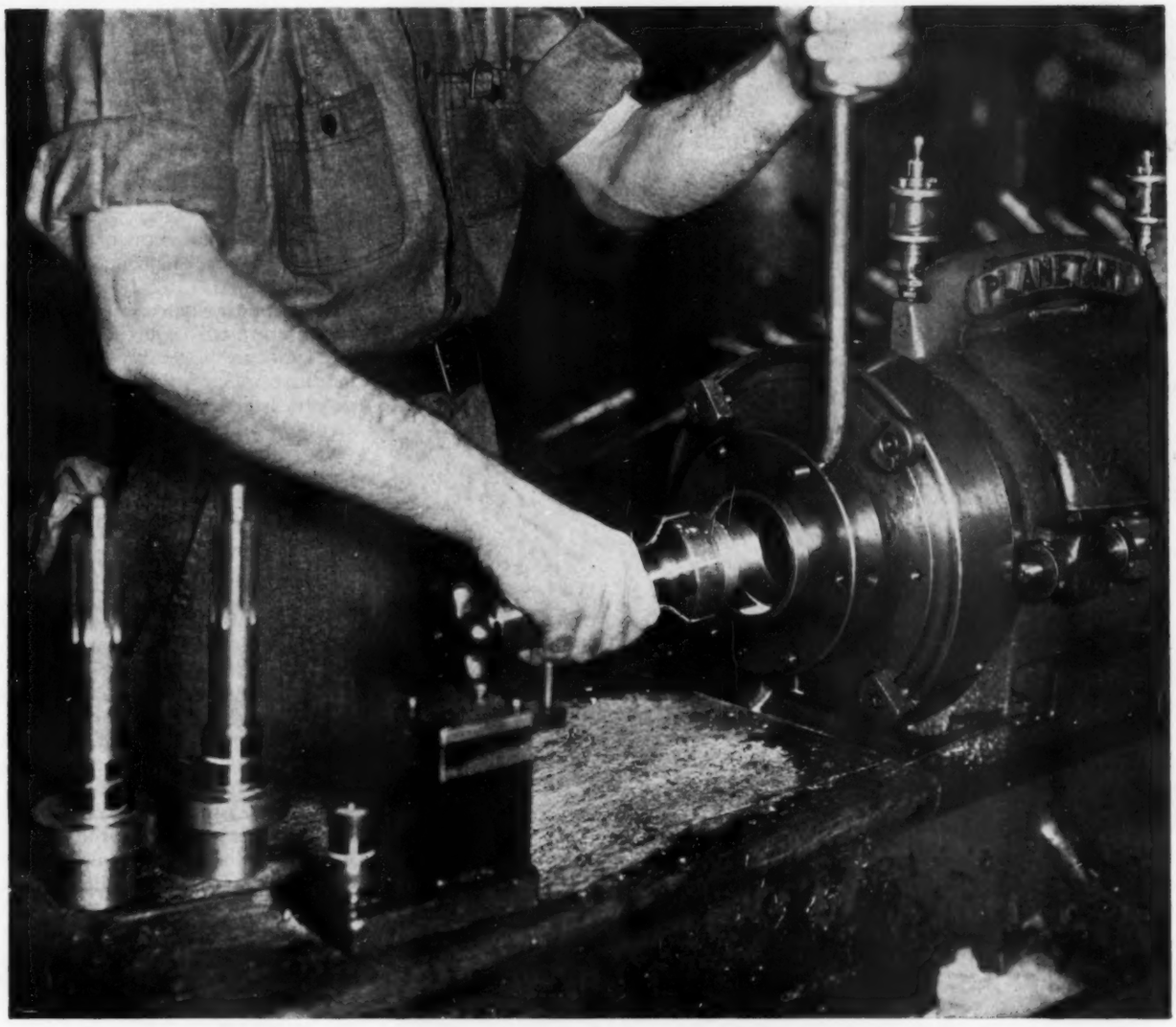
Eighteen teeth and three involute slots on the clutch gear are cut on high-speed gear shapers

In the final-assembly department there is a double-unit assembly conveyor with capacity of over 200 transmissions per hour. After transmissions are assembled, they are suspended on a power conveyor and taken to sound-proof test rooms. Each unit is filled with oil and placed on a test machine which duplicates the running conditions of a transmission after being assembled in a car. Approved transmissions then are carried through a paint booth where they are sprayed and thence to the loading dock.

Some of the highlights of machining operations in Plant 1 are as follows:

An internal planetary-type milling machine is used to finish and recenter the hole in the head end of the clutch gear. The work piece is loaded into a separate collet which is clamped in the chuck at one end of the machine, where it remains stationary throughout the milling operation. When the machine is started the formed milling cutter, revolving on its own axis, also starts from the center of the hole and moves radially outward to the desired depth of cut and then travels once around the periphery of the hole and finally returns radially to the starting position. The collet is then withdrawn for unloading while the second collet, loaded during the machining cycle, is clamped ready to repeat the operation.

The eighteen teeth and three involute slots in the head end of the clutch gear are cut on a battery of high-speed gear shapers. Each machine operates with a three-step, depth-feed cam and special two-piece compound cutters to complete the operation in one setting. The two cutters, which machine over 100 pieces per grind, are mounted in tandem on the tool spindle, the upper tool shaping the teeth while the other mounted



After loading in a collet, the clutch gear is put in a planetary-type miller for finishing and recentering the hole in the head end

beneath cuts the slots. These cutters are set in proper relationship to each other and in alignment with the work spindle by a special gage which fits into the work spindle chuck. The stem end of the clutch gear is loaded into a chuck with mechanically-operated jaws, and a foot-operated ejector aids in removing the work.

Multi-Operation Turning

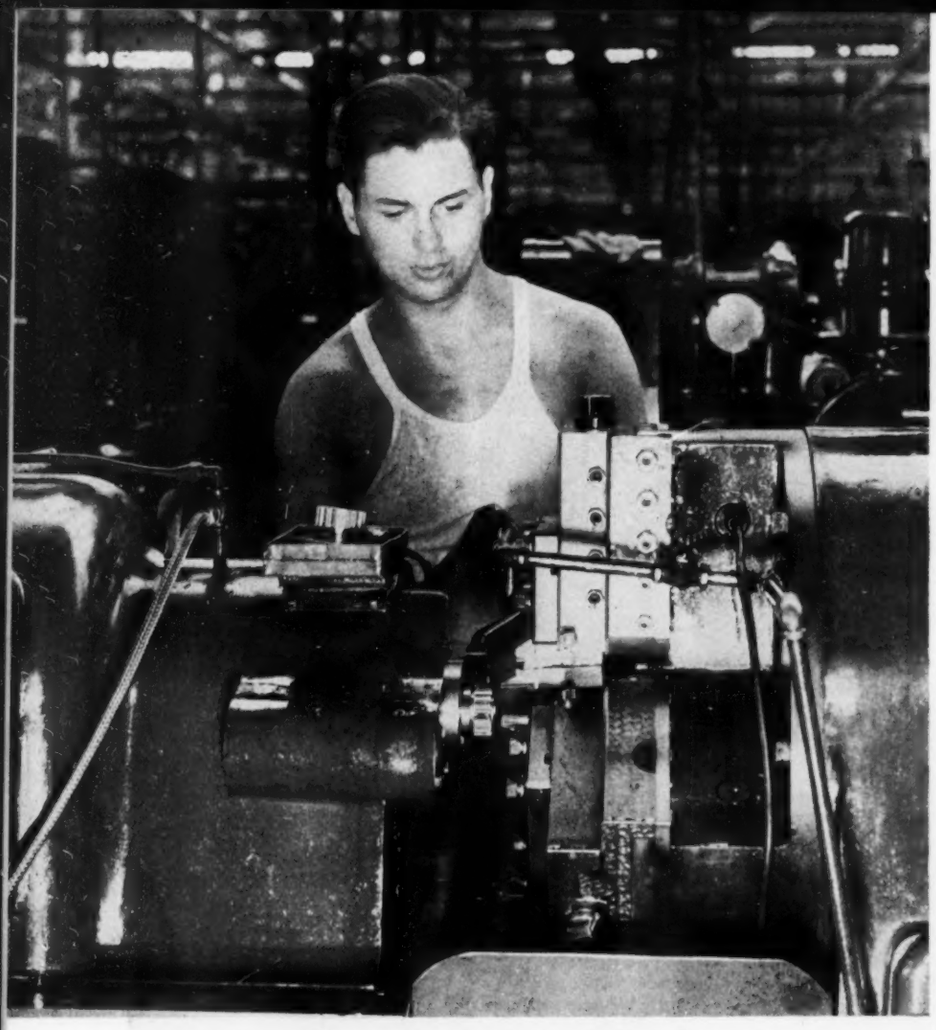
Stem end of the clutch gear is turned on a six-spindle Mult-Au-Matic. All five of the operating stations are utilized, the first having eight tools which feed vertically to rough turn the diameter. The second station, using the same tool set-up as the first station, further rough turns the same diameter, while the third station, with three tools and a horizontal feed, faces the shoulders. The fourth station has a horizontal feed and is so arranged that one tool faces the lower shoulder while the second tool chamfers the pilot end of the gear blank. The fifth station finish turns all diameters of the work with six tools which are fed into the gear blank vertically. The work is held between centers and driven by three-jawed automatic gripping drivers.

A special-purpose, high-speed gear shaper cuts three slots having involute sides in the second-speed gear. The machine cuts the three slots simultaneously with tools ground to the size and shape of the slot. These tools are fed in radially on the work which reciprocates horizontally. The tool feed is so synchronized with the work motion that on each back stroke of the work the tools are retracted and there is no back drag.

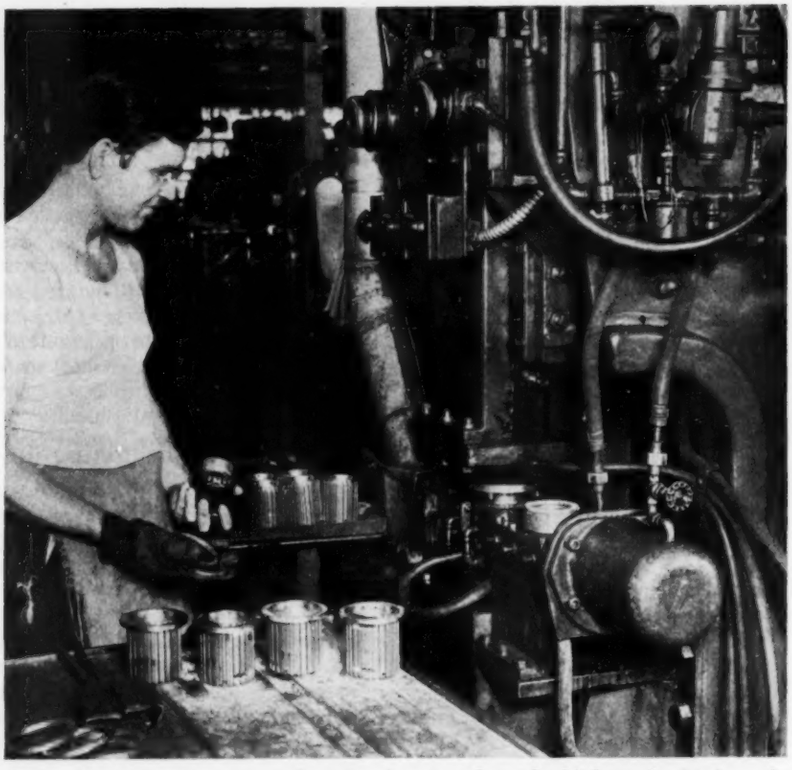
The work is held on an expanding arbor and is located by a hinged gage pawl which enters a slot cut in a preceding operation. The head carrying the gear is brought into cutting position by a hydraulic cylinder. Tool feed and reciprocation of the work head are, however, entirely mechanical. The large productive capacity of the machine is due to its rigid construction which, with the short stroke required to cut the formed slots, permits a heavy feed to be used.

Spline Chamfering

A standard single-spindle hobbing machine with special attachments is used to chamfer both ends of the internal spline of the first and reverse gear. The work-piece is held in the usual position with an air-operated expanding chuck. A lever advances the carriage, equipped with a hob of special design, into cutting position against a fixed stop. One revolution of the work completes the chamfer on one end of the gear. The work is then turned over and the opposite



Three involute slots in the second-speed gear are cut on a special-purpose horizontal gear shaper



Low contact pressure is used until the second- and third-speed clutch and ring reach welding temperature; then high pressure is automatically applied

is end chamfered in the same manner.

The helical gear of the countergear is cut on a special eight-station rotary hobbing machine. The work is located between centers and driven by two pins which engage holes drilled in one end. The gear is inserted in the machine at the loading station, and at the end of one cycle is completed with the involute form of the teeth cut within 0.0005 in. of the true curve.

Reciprocating-type shaving machines are used on all helical gears. The gears are placed between centers in direct mesh with a reciprocating rack with serrated teeth which have a cutting or "shaving" action on the gear teeth. This removes all irregularities left by the preceding hobbing operation and produces an involute which checks within 0.0003 in. of the true curve.

Welded Clutch

Welding is employed to assemble the second- and third-speed clutch and ring. For this job a two-stage projection welder which produces perfect welds has been developed. The parts to be welded are brought together at a relatively low contact pressure while the heating takes place, thus assuring a maximum of heat energy available at the desired location. When the required weld temperature is obtained, the current is interrupted and a high pressure is automatically applied which instantaneously unites the two parts.

The three outside diameters of the reverse idler gear are rough turned on a heavy-duty production lathe tooled with front and rear tool blocks and a cam feed. The front tool block, which carries three turning tools, feeds longitudinally across the three outside diameters of the gear blank, while the rear tool block, feeding transversely, has four facing tools each of which faces one end of the double gear. This block is also tooled with three chamfering tools to break the outside corners. A keyed arbor is used to drive the work, which is positioned between a cone center on the tailstock and another on the headstock end of the arbor.

Both ends of the reverse idler gear are shaved in one operation. The machine used to do this employs the principle of limited "crossed-axes" shaving, wherein the helical cutter runs in mesh with the spur gear to correct the profile, index and eccentricity of the gear. The profile is within 0.0003 in. of the true involute curve with a bright and smooth surface.

Top face of the transmission case

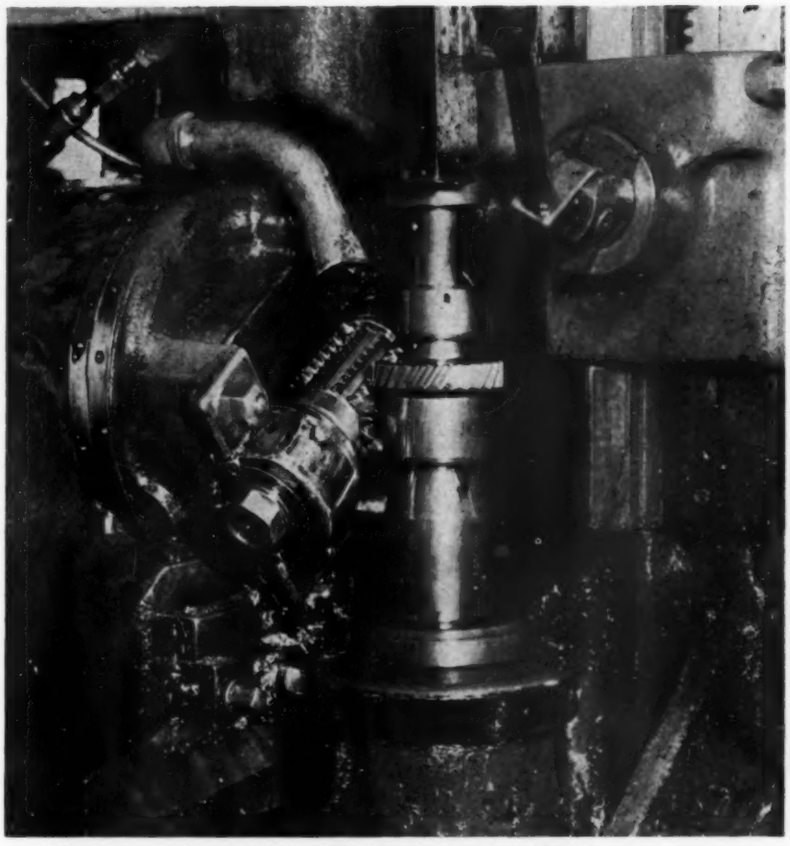
is finished on a large continuous, horizontal-axis, drum-type milling machine. The work drum of the machine is equipped with 30 fixtures in two rows of fifteen each. The case is loaded on a solid arbor which passes through the main bearing hole, locating the front face of the work on the base of the fixture, and is held in angular alignment by a pin which engages the counter shaft hole. The work is held in place by large U-washers and nuts. The washers are joined in pairs by bridge bars, which tie the two rows of fixtures together at their outer ends to add to the rigidity of the set-up. The machine is set up with four 12-in. inserted-tooth cutters with one roughing cutter and one finishing cutter for each row of fixtures.

A vertical six-spindle automatic lathe is used to machine the spherical radius for the universal joint ball and finish the rear face of the transmission case. The work is loaded on an arbor with expanding pins, locating on the finished mainshaft bores. At the several working stations the rear face is roughed and finished, the chamfer is completed, and the spherical seat roughed and finished with generating tools.

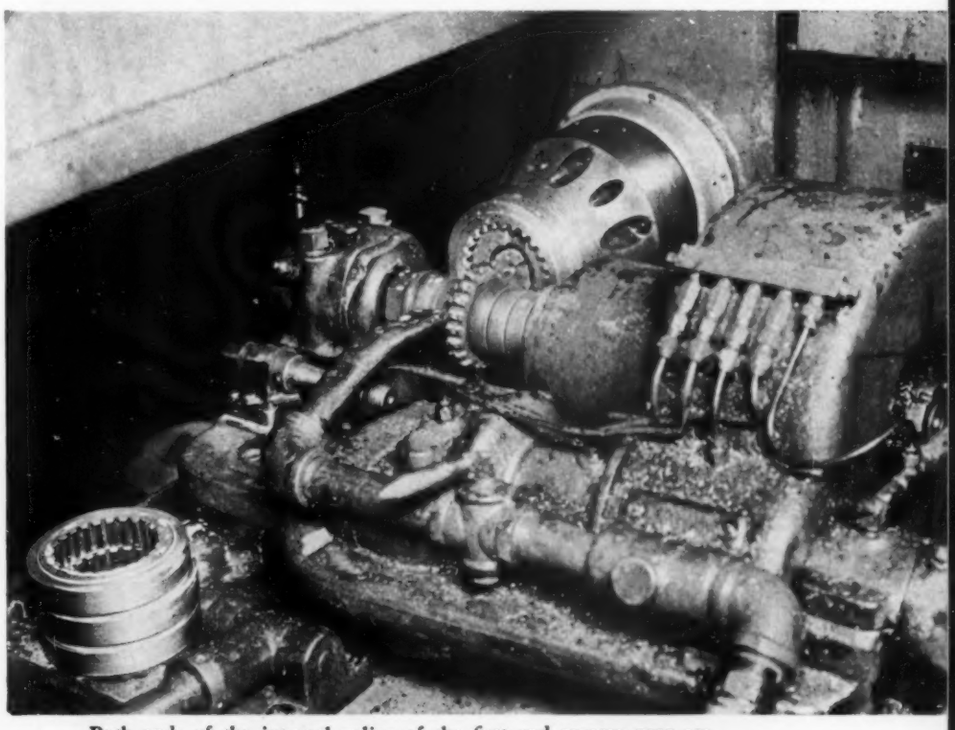
The two shifter-yoke slots on the inside of the transmission case are milled on a regular production-type milling machine equipped with a special knee. The special knee contains cams which feed the work in a vertical direction and then index it angularly in a horizontal plane, making the operation semi-automatic. On the front face of the column is gibbed a stationary plate which carries the semi-automatic sliding knee.

Cycle of Special Knee

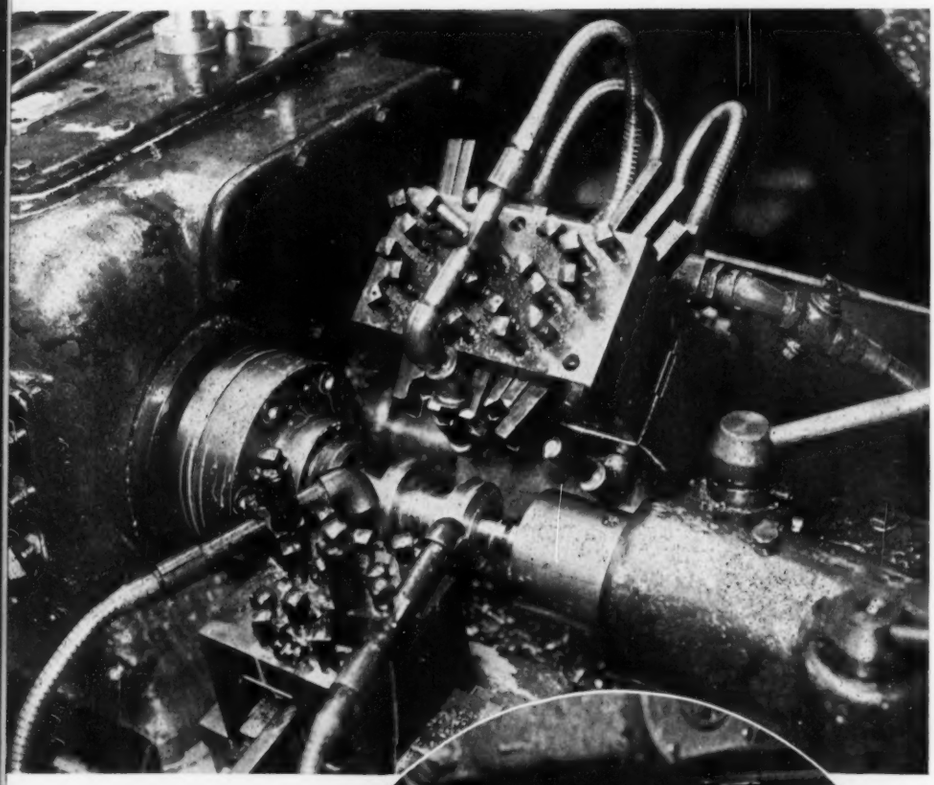
The work-piece is loaded in a box-type fixture where it is located from the previously machined surfaces and bored holes and is held with a quick-acting clamp. The feed then is thrown in, making the knee complete a cycle up and back to the starting point where the index mechanism is engaged. The work-piece is then rotated 107 deg., bringing the second boss into position to be cut. At this point the index mechanism is disengaged and the knee again makes a complete cycle up and down. After this the index is again engaged and the work-piece brought back to the original starting position where the feed is tripped out automatically and the work is in position to be unloaded. The special tools used for this operation is a two-stepped end mill with tungsten-carbide tips on the outer step and a regular high-speed



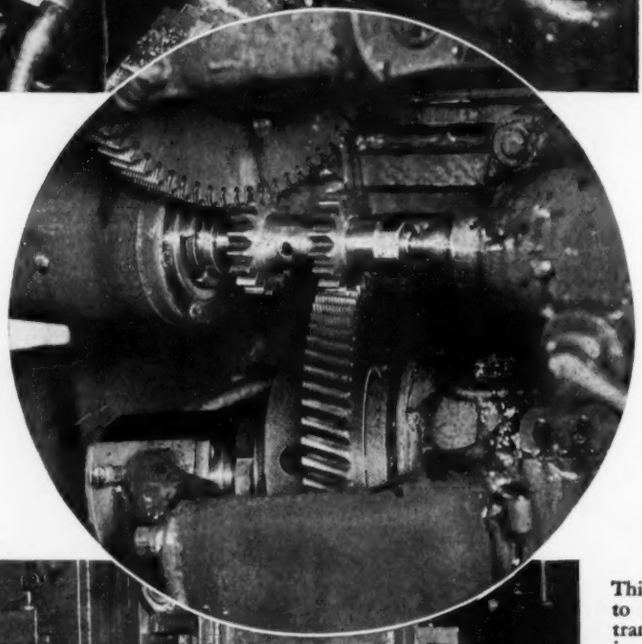
An eight-station Cleveland rotary hobber is set up for the helical gear of the counter gear. The work is located between centers and driven by two pins which engage drilled holes in one end



Both ends of the internal spline of the first and reverse gear are hobbed on a Barber-Colman machine with special attachments

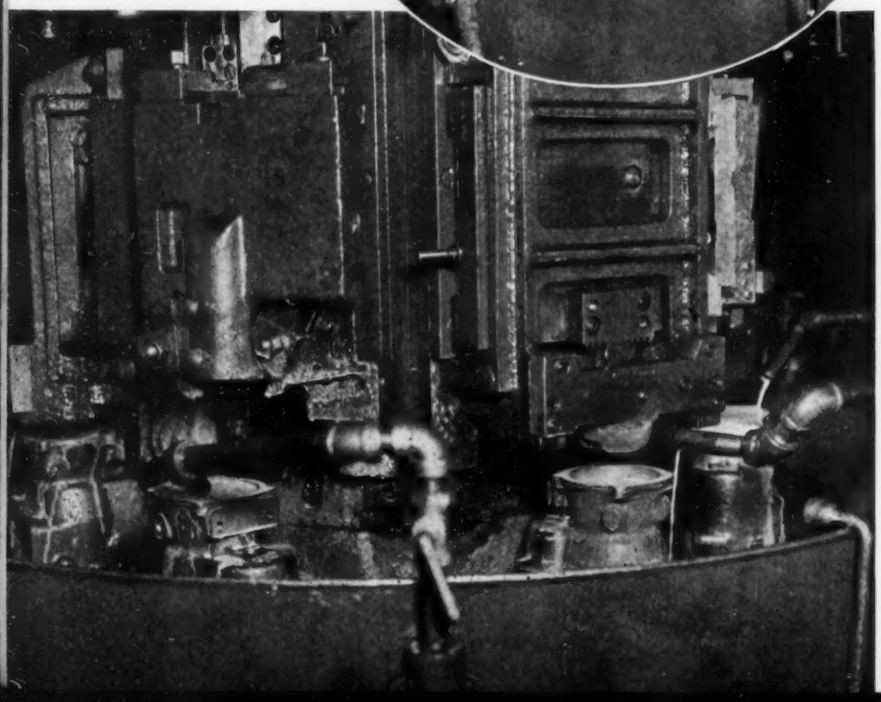


A Fay automatic rough turns three diameters of the reverse idler gear and faces the double gear



Seventeen teeth in both ends of the reverse idler gear are shaved by a "crossed-axes" machine

Transmission cases have the spherical radius machined for the universal - joint ball and the rear face finished in a six-spindle, vertical automatic



steel end mill on the inner step. The cutter is held in an extension arbor and faces the boss at the same time that the slot is milled.

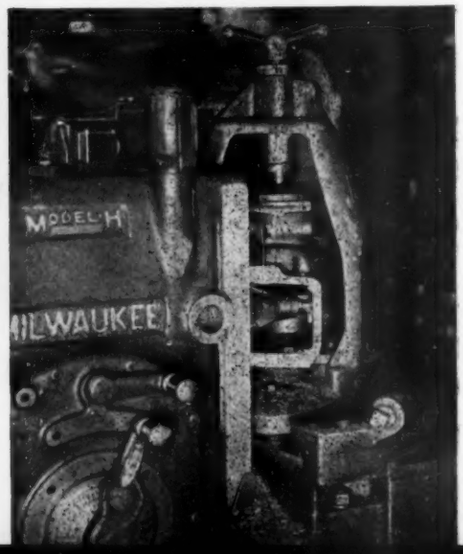
In the heat-treating process gears are preheated and immersed in cyanide pots until they reach a temperature of 1,490 F. and then are quenched in oil tanks. They are conveyed by monorail through a washer to remove any cyanide and oil and then pass into a tempering furnace for 90 min. at a temperature of 490 F. Some parts, particularly the smaller ones, are carburized in rotary furnaces.

Quality Control

To control the quality of gears, a metallurgical department is maintained to test the chemical constituents and physical properties of the steel used. The department also examines all electroplating and pickling baths used in the manufacture of bumpers and in the cleaning of gear forgings prior to machining. In the center of Plant 1 is a toolroom with a corps of skilled toolmakers who make and repair tools, gages, jigs and fixtures required in transmission production.

To the northwest of the toolroom is the tool-inspection department which carries on routine inspection of toolroom work. It also checks and maintains all instruments such as gages, micrometers, indicators and hardness testing machines used in production and inspection. The department has measuring and testing instruments of great precision, special master gages having an accuracy up to four-millionths of an inch. Working to close predetermined tolerances, Plant 1 has an inspector for every nine production workers.

This fixture is automatically indexed 107 deg. to mill in turn two shifter yoke slots in the transmission case. A special two-step end mill is used, having tungsten-carbide tips on the outer step and high-speed steel on the inner step

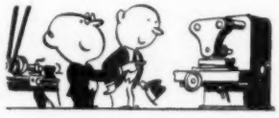


TALKING SHOP

West of the Rockies

Some of the men we talk to in the industrial centers of the country, most of which are east of the Mississippi River, seem to think that the big region west of the Rocky Mountains is a separate country. Strange to say some of the men in the shops out there apparently have the same feeling about it. Perhaps it is, but a round of visits to some 25 or 30 shops in the Northwest leads us to believe that the differences are more imaginary than real between eastern and western machine shops and that the shops doing the same kind of work in the two regions use very much the same sort of methods and equipment.

After talking with a lot of the superintendents and works managers of



these western shops, we agree with those who told us that they thought that every western shop executive ought to get a trip east every few years just to see what the other fellows were doing. In view of the rapid development of the airplane industry in California during the past year, it might be a splendid idea for some of these northwestern men to go south as well as east. They would see in some of these plants pretty up-to-date applications of mass assembling methods at any rate.

Creative Workers

Speaking of west coast men moving south reminds us that when things were black not so long ago in the northwest some of the men laid off drifted down to the California automobile assembly plants to try their hand at that type of work. Very few of them could stand it over a week because it was so different from the kind of work in which they had spent their lives. Automobile assembly in the west is no different from automobile assembly in Detroit and demands the same mental attitude on the part of the men engaged in it. As we know from many observations the men on an automobile assembly line have a point of view very different from that of men in general machine shops. They know only one or two jobs and they are happiest when assigned to a job that requires only manual dexterity and no exercise of

the gray matter. A machinist, on the other hand, is a creative worker who is accustomed to take a job through from raw material to somewhere near a finished product, and he is used to a variety of jobs or operations and the almost constant use of his brain and imagination. Of course he is miserable when he attempts to do a mass production single operation which is to him deadly monotony.

Specialties

Because of the circumstances surrounding them on the west coast many of the owners of these shops have adopted the policy of building specialties of one sort or another that are not in competition with products made in the larger shops farther east. As might be expected most of these specialties are for industries identified with the Pacific Coast such as lumber, food canning and woodworking. Parenthetically, it is interesting to observe that one of the major can making companies has an important can machinery manufacturing shop in the Northwest. Generally speaking, specialties are made in small lots or as single items and the equipment needed is of the general purpose type. This explains why some of the west-coast shop men were disappointed at the last machine tool show when they observed that most of the important advances had been made in machine tools that had their most important applications in the automobile industry. In view of the fact that the automobile industry has been the best market for the machine tool builders, it is not hard to see why the developments in this direction were so outstanding.

The making of some of these specialties has involved the application of unusual and in some cases difficult-to-machine materials. Acids encountered in the paper making industry, for example, play havoc with ordinary steels and even with the usual grades of chromium alloy steels. To meet this condition it has been found by one pump manufacturer that a steel containing chromium and molybdenum best meets the requirements. Tungsten carbide cutting tools have not been very satisfactory so far in cutting this material, but experiments are still going on. Since no

other companies seem to be using this particular alloy the shop in question had to develop its own technique of machining by trial and error.

While some of the specialty products of the west coast shops are relatively rough and do not have to be made to close limits, others of them are quite as precise as anything to be found in the great majority of eastern plants. Cutter heads for woodworking machines that operate at from 7,000 to 10,000 r.p.m. have to be balanced very precisely and their parts have to be accurately made.

Labor Relations

Relations with employees differ as widely in west coast shops as they do in ones nearer the industrial center of the country. Some of the shops are closed shops, a few are open, some have well-developed independent employee representation groups. By reason of the fact that the west coast shop worker is generally a craftsman, craft unions have made more headway than industrial unions in most places. Since most of the shops are relatively small and do not employ very large numbers of men, the employer has a much better chance to know his own men and to deal satisfactorily with them. *The Editors*

Press Tools Simplify A Manufacturing Set-Up

Greater accuracy and fewer operations follow the adoption of tooling for a complicated small part

FRED H. COLVIN
Editor

PRODUCTION engineers and executives, foremen and toolmakers in small or medium-sized shops are frequently called upon to make a part that differs materially from work with which they are familiar. In such cases it is often of great assistance to learn how somewhat similar pieces have been handled in other shops. It is unlikely that the pieces will closely resemble each other, but the operations necessary and the methods of handling may contain valuable suggestions. These may be found in the manufacturing sequence and tooling recently adopted by the National Cash Register Company for a typical part in one of its machines. A considerable saving is being obtained.

The piece is the counter-carrying arm shown in Fig 1. with some of the main dimensions. It is made of 0.187-in. soft punching steel. The sequence of machine operations shown in Fig. 2 gives the shop much helpful information, particularly the limits set for each stage of manufacture. Tools for the various operations are made from standardized parts so far as practicable. Thus, the toolmaker receives with the blueprint of the tool to be made as many of these standardized parts as it seems advisable to use.

The list of operations for this piece is as follows:

1. Blank large enough to allow $\frac{1}{16}$ in. all around for trimming and shaving after swaging.
2. Rattle in open-type tumbling barrels with wet sawdust to remove the burrs left in blanking.
3. Anneal to remove strains arising from cold working at the edges of the blank.
4. Pickle.
5. Copper plate, to lubricate the work while in the swaging die.
6. Swage, to reduce thickness to 0.08 in. on the cam end and other portions.
7. Drill two 0.093-in. holes and two 0.0995-in. holes. The smaller holes are used for locating in all operations that follow, whereas the larger holes are later enlarged to form ends of the 0.125 in. slot. Their purpose is to relieve the load on the small piercing punch for the slot in the piercing and shaving operations.
8. File and burr.
9. Trim in a die, locating from the two 0.093 in. holes and allow from 0.019 to 0.030 in. stock on each side for shaving.
10. First shaving operation. Note that the shaving dies are relieved in places and do not shave at junction of the different thickness sections. Allow 0.007 in. on each side for second shaving.
11. Second shaving operation.
12. Inspect with special gage. Note that plugs are used through bushings in the gage to determine the position of the ends of the cam slots. The limits on the width of the slots are held by go and not go plug gages.
13. Mill clearance cut.
14. Strip the copper plating.
15. Caseharden.
16. Assemble the small stud.

The various operations that produce this part are of special interest because of the shape of the part and the close limits involved. The sequence of operations shown is the result of careful study which has reduced their number appreciably over the orthodox manner of handling such a piece. The methods selected also secures greater accuracy as well as fewer operations. Some of the

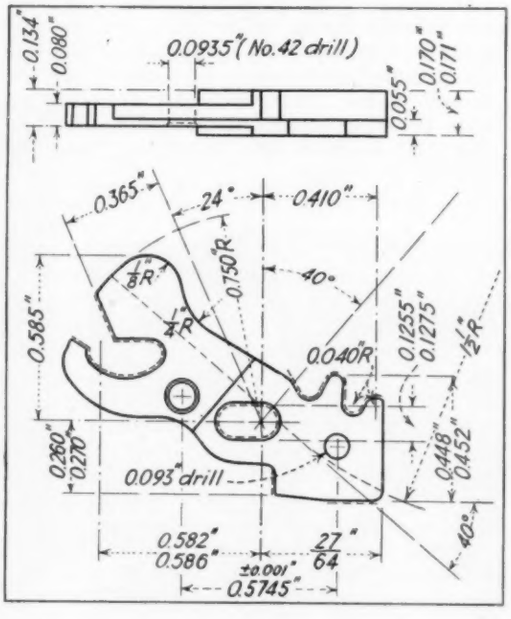


Fig. 1—Swaging and accurate shaving accomplish the same results as more orthodox methods and at lower cost

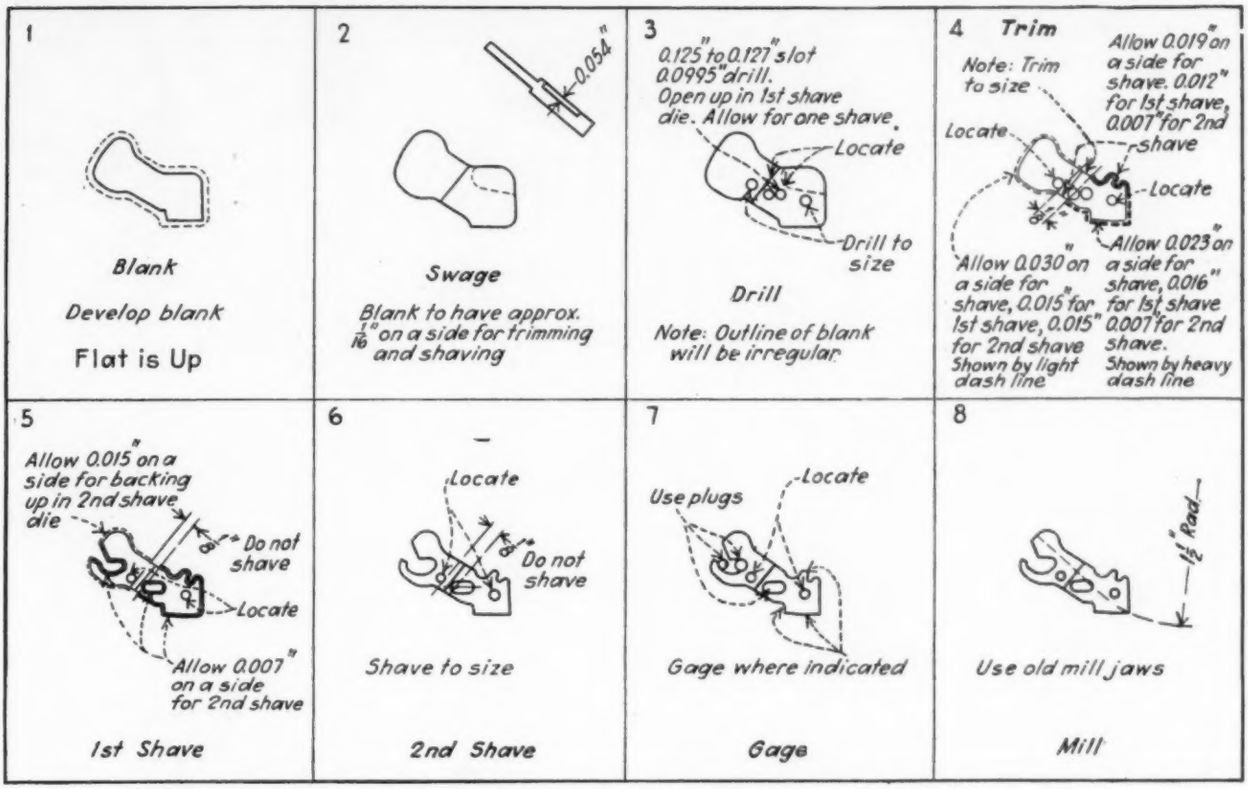


Fig. 2—A sequence of machine operation guides the toolmaker and gives him the over-all picture of what the manufacturing sequence is to be, together with the limits at each step

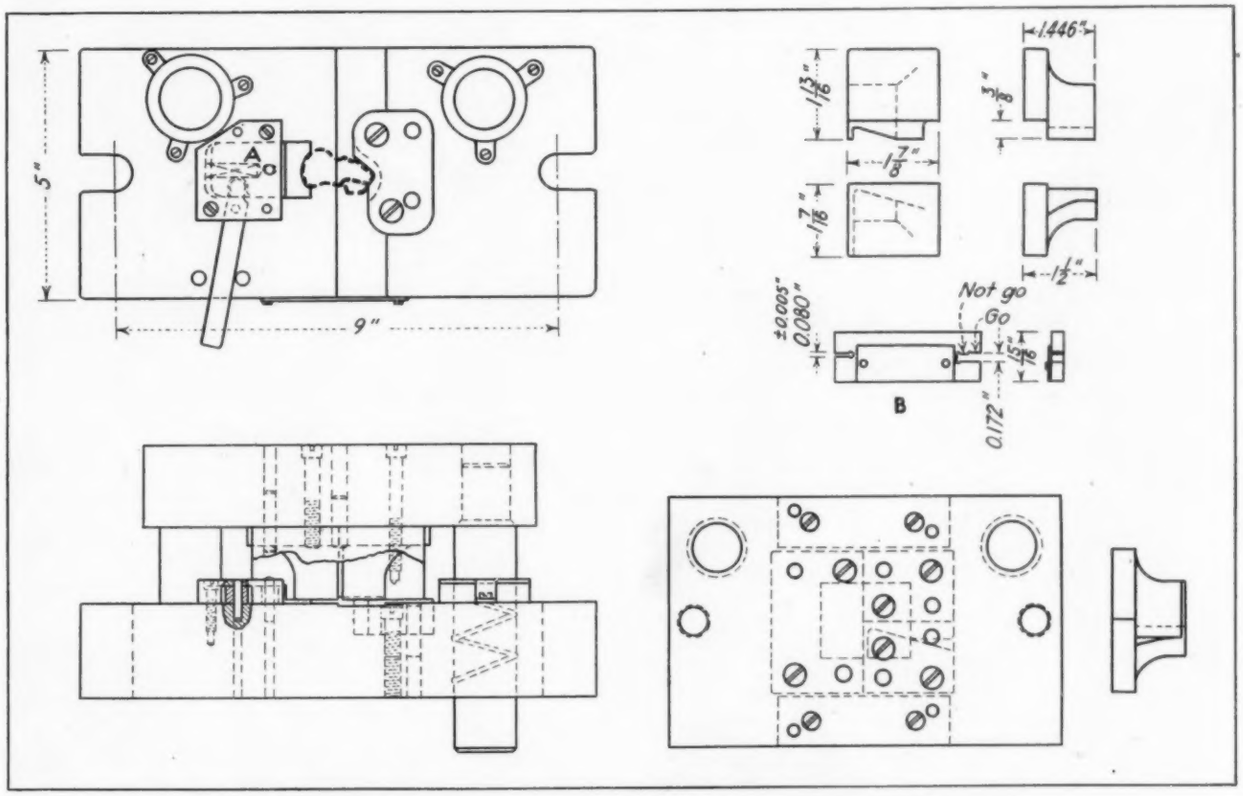
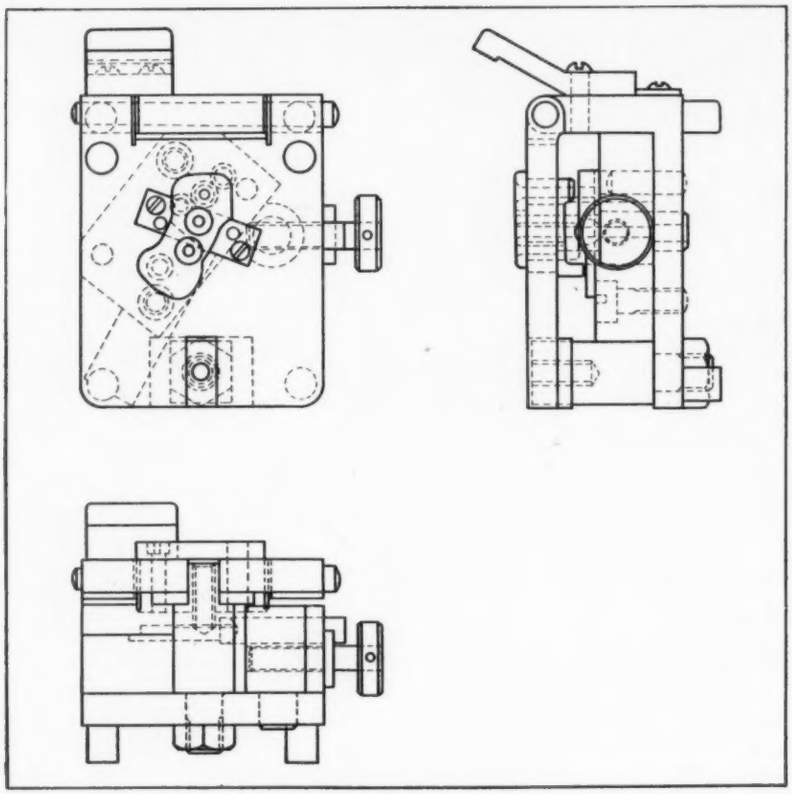


Fig. 3—Sectional swaging punches are made with the parting lines corresponding to the edges of steps in the piece, avoiding working out square corners



tolerances are illustrated in Fig. 1.

The blanking die is of the ordinary open type, but is mounted on a standard die shoe with a machine steel base. Semi-circular, sheet-steel safety guards around the guide pins prevent possibility of accident.

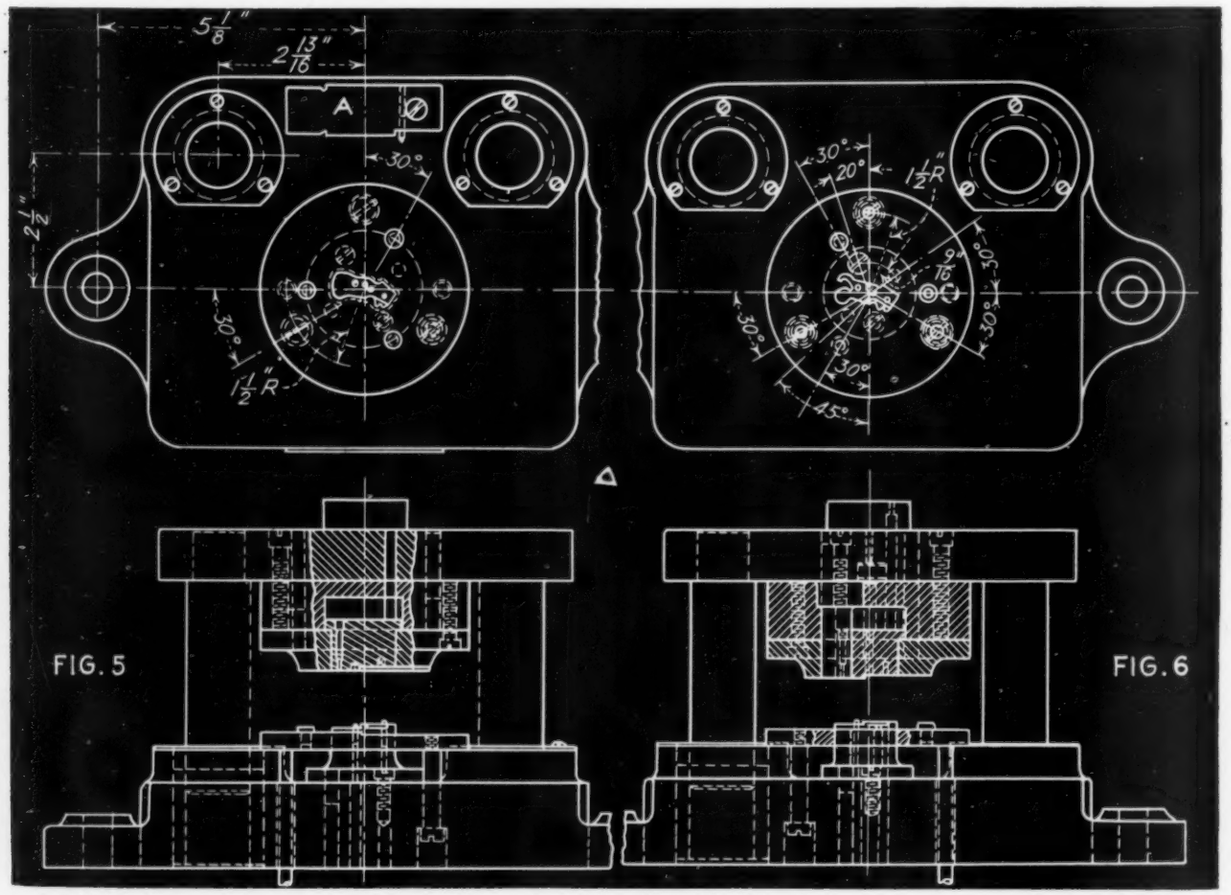
Sectional Swaging Punches

Swaging is the next operation, the die set being seen in Fig. 3, which also shows the tools used. The punch is made in three parts, the parting lines corresponding to the edges of the swaged steps on the finished parts. Making the punches in this way eliminates the necessity of working out the square corners by hand.

The stock locator *A* is controlled by a spring which allows it to move as the metal flows during the swaging process. The extension handle on *A* makes it easy to insert the blanks and to remove them after swaging. Gage *B* accompanies this die and

Fig. 4—A removable bushing plate must be used with this drill jig because the 0.0995-in. holes are too close for separate bushings

Fig. 5—Approximately 1/16 in. is left on a side for trimming which removes all except 0.019 to 0.023 in. for the two shaving operations. Fig. 6—The round-ended slot is produced and the outline is shaved to two allowances in the first shaving die



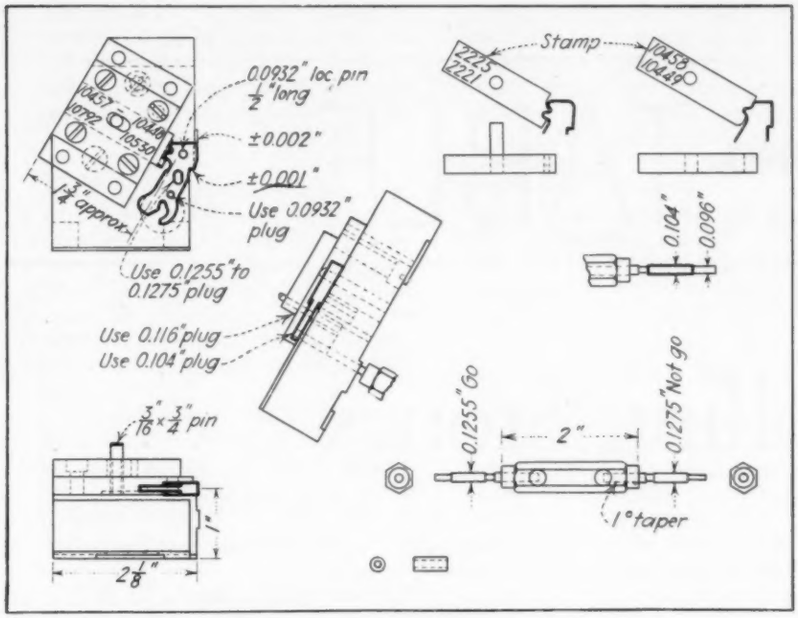


Fig. 7—These gages are used to check the accuracy of the important contours of the finished piece

makes it easy to check the work when the die is set up as well as at intervals during the run. The use of this gage immediately detects any displacement of parts on the die while in use. Although it is not practicable to use standard die shoes on this type of die, standard guide pins, oilers and other parts are used.

A standard body is used for the drill jig, Fig. 4. Hardened wear plates are used in the hinge of the lid to minimize side wear from constant use. Jigs of this kind are made up in quantities and carried in stock. Both the lid step and the clamp are stock parts. A plate is used for the two 0.0995 in. holes as the center distance is too close to use separate bushings successfully. Then too any inaccuracy will be corrected in the shaving die that finishes the slot. The end holes are drilled through bushings in the usual way.

Standardized Dies

Trimming the blank comes next, both the trimming and shaving die sets being of standard design and made up in large lots for such uses. They are carried, completely assembled, in the Tool Room Stock Room. The stripper, screws, die block, spacer and shedder are all stock parts and are only machined to fit the part to be handled in the die needed. This type of die set is shown in some detail in Fig. 5. The gage used is seen at *A*. Amount of material left for shaving varies from 0.019 to 0.023 in. as shown with the detail trimming sketch of the part in Fig. 2.

The first shaving operation also cuts the metal between the two 0.995 in. holes, making the round-ended slot near the center. As the die set is the same for the trimming and for both shaving operations, only the shaving punch and die are shown in Fig. 6. The second shaving operation removes 0.007 in. on each side, using a shaving die set made on the same standard die set. In milling the clearance cut, the piece is held in simple vise jaws made to fit the sides of the work.

Inspection Gages

Several gages are used for inspecting the various surfaces and their relation to each other. These are shown in some detail in Fig. 7. They require little explanation as their applications can be readily seen. These gages, it will be noted, are in plications can be readily seen. These in connection with some of the operations.

When tools of this kind are ordered, each drawing furnished the toolroom contains complete specifications for all parts of the die. This information includes the amount of allowance that is permissible and shows where the allowance is to be made. There are also standards for indicator or gage blocks, the one used in Fig. 7 being known as No. 6 of the set.

A Tip for Those Who Wear Glasses

Shop and office workers are often annoyed during warm weather by having glasses and goggles become blurred from condensed moisture on the lens. It is claimed that wiping the glasses with a clean cloth that has been dipped in glycerine will make for clearer vision.

Die Design and Die Making

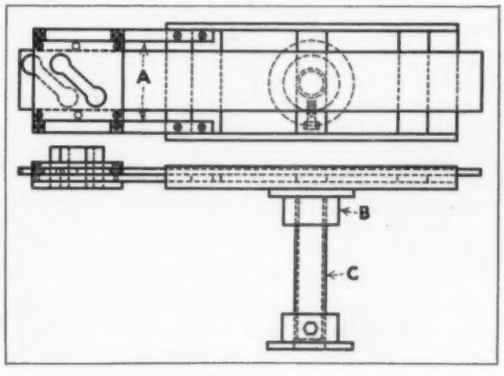
IRA S. WILLIAMS

The economy of temporary unmounted blank dies was stressed by E. G. Marshall (*AM*—Vol. 80, page 305). I think the stock guide in his Fig. 6 can be improved upon, and that the guide in the accompanying illustration will further cut the cost when used in connection with unmounted blank dies, since the stock can be cut to longer lengths and can be more easily handled.

The spaces between the stripper and the die have extensions at the corners of the die for the purpose of making the die assembly fast to the stock handling device by the use of the supports *A*. The stock holding device is a wooden trough having three cross members to support the stock, and which can be replaced as they wear. The device is supported by a floor stand. It rests on the flange *B* which is a free fit on the pipe standard *C*, permitting the die to be rotated back and forth under the ram and between the upper and lower planish blocks.

The stand can be adjusted for height and made fast by the setscrew in the floor flange.

The stock holding device is a wooden trough having three cross members to support the stock, and which can be replaced when worn. It is supported by a heavily built floorstand



ROUND TABLE

Rolling Stones

"Did I see Bill Harris working on the big planer, Al?"

"Guess you did, unless your eyes have gone bad, Ed."

"How does it happen that he's back here? Didn't you fire him a couple of years ago?"

"Not exactly, Ed. We had a decided difference of opinion and we both decided to part company. Sort of a 50-50 firing match, I guess."

"So he had to come crawling back for a job, Ed? And you were soft hearted enough to take him back."

"Not exactly that either, Ed. I met Bill on the street the other day and we had a little chat about things in general. We needed a good planer hand, and I asked him if he wanted the job."

"So you crawled instead of Bill. A fine way to keep discipline! When I fire a man he stays fired."

"You must be one of the few people who are always right, Ed. Fortunately there aren't too many of them or we'd all be wearing bullet-proof vests. Life's too short to hold grudges very long."

"But why do you want a lot of 'floaters' in the shop? Bill never stays in one place for more than a year or two. You know that, Al."

"That is all too true, Ed. He's one of those men with an itching foot, but I'm not sure it's all bad. He gets around and sees how other shops are run."

"So you don't believe in the old motto about the rolling stone gathering no moss. What has Bill got to show for his wanderings? He doesn't own his own home, and he doesn't stay long enough in any one place to make a lot of friends."

"Partly true, Ed. But Bill has learned more about planers than any man in town. He can make that machine of his do almost everything except talk. He's learned more ways of setting up ticklish jobs than any man I've met or heard about."

"Then why don't he stick to a job so he can earn more money? He has to start at the bottom every time he changes."

"That's another place where you're

wrong, Ed. He doesn't do anything of the kind—except for the first week."

"You don't pay him more than he got before, Al?"

"After the first week I was glad to. He works a week at almost any going wage. If he makes good he gets a higher rate—and he makes good. He's the cheapest man in the shop because he can get the work out right."

"But he must have a lot of time between jobs, Al."

"Not much, Ed. And though Bill doesn't own a house, he's salted away enough to keep going between jobs. He's brought us a lot of new ideas; I only wish we had a few more rolling stones."

"I still want the steady ones, Al. This changing of men upsets the shop."

"You mean that you want the men to run the shop so you won't have to do it. I'll work a bit harder to get a few more men like Bill—even if they only stay a year or so."

Which is more valuable—the steady workman who remains in one shop year after year or the "rolling stone" with broad experience?

DISCUSSION

Private Lives

Many men are stumped at writing intelligent answers to questions on application blanks, even though they may be skilled in any mechanical work they may attempt. Whether an employer secures wholly reliable answers or not, he should not judge a man entirely by his application blank. An applicant who shows promise should be given an opportunity to prove himself.

—G. McARDLE

In the final analysis, the most important thing an employer wants to know regarding an employee is what he can do towards turning out an honest day's work and what job he is best suited for. I have yet to find a substitute for a conversation with a prospective employee as he sits across my desk and answers certain pointed questions. One of the most important essentials is to get the person being interviewed perfectly at ease; when this is done, an informal chat will bring out more of the man's character than all of the application blanks yet conceived.

Questions that indicate a man's experience and skill are most important. This is something that should be gone into carefully by a person who is competent to judge whether or not the man is telling the truth. Correct questions and intelligent analysis of the answers will go a long way toward determining the honesty of

the applicant. Certain intelligence and skill tests have much to be said for them; also much can be determined from the manner in which men fill out their application blanks.

—O. W. WINTER

I feel that an expert in his line resents being put through the third degree by someone whose line of business is entirely foreign to his own. What old-timer does not look back upon the pleasure he derived from talking directly with the superintendent or foreman when he was looking for a job?

My dad applied for a job in the Rock Island shops in Chicago when he was about my age. After sweating through one of those complicated application forms he was told that he was just two years above the hiring age.

After that he resorted to hair-dye and became proficient in the successful use of white lies.—J. HOMEWOOD

The Conscientious Workman

It is going to be something of a chore to get that "high-accuracy" complex out of Henderson. Nevertheless, in most cases, that very difficult chore is one worth performing. I would far rather grade too-high accuracy downward, than attempt to take a man naturally sloppy with his work and persuade him to grade it upward. Usually a confirmed idealist can be better separated from his wrong ideal by giving him a new one. It is possible that Henderson, by means of an occasional straight talk, can be brought to see that his employer is also a stickler for accuracy. Very often, team work by two or more supervisors, is far more effective than a great deal said by one man.

—JOHN E. HYLER

Bird in Hand

Unsolicited inquiries regarding a product are always flattering. This is particularly true when a resulting order is of some size and is only dependent upon a favorable delivery promise. Orders resulting from unsolicited inquiries are usually the result of a product selling itself through the ability to meet the requirements for which it was designed. Consequently, the distribution of such an article in new fields often opens up new avenues for future sales.

While it may be a noble gesture to anticipate the requirements of old friends and customers, it is not logical to make it difficult for new prospects to become old customers. Every effort should be extended to secure and hold new business and make new friends, even at the expense of slight inconveniences caused established customers, particularly when such inconveniences are inadvertently caused by over-taxed facilities.

Established customers are generally an understanding lot and are often faced with the same problems as suppliers to their own customers.

—IRA S. WILLIAMS

Play With Pay

While special craftsmen are missed far more than the ordinary workmen, there is no reason why any man should be absolutely indispensable, providing the management and supervisory force is alert. Any man doing special work should have placed with him another skilled man or an intelligent youth who will become able to fill the gap and tide over during an emergency or a vacation period. Such an arrangement will justify itself in more ways than one.

It is unwise to let any job become dependent upon one or even two men. Such a policy will sooner or later prove a mistake.

—WILLIAM BRYCE
Lineley, Sheffield, England

No man is so indispensable that he cannot be given a vacation. Loss of time due to illness is considered a necessary evil and is often greater than would be caused by a vacation plan.

Vacations will unavoidably interfere with production, but the difficulty caused will not be great if they are properly planned. The spread-over should be as large as possible, and each man's holiday should be given him at the most convenient time, considering first, of course, production and the interests of other men.

—W. E. WARNER
Sompting, Sussex, England

Machine Tool Standardization

We purchase machines from a large number of manufacturers and, due to the way we spread our business, we are continually faced with the problem of standardization. To take a hypothetical case—if we have five engine lathes to purchase and we buy one from each of five manufacturers, almost invariably it is necessary for us to develop five sets of time standards for these machines. You can realize what this means in the way of time study and clerical work. If at all possible we would like to see standardization as to speeds, feeds, limiting working dimensions and the placing of operating levers.

Our investment in small tools is as large or larger than our investment in capital account equipment and the question of standardization of small tools is a serious one. When a production supervisor is checking the progress of an order through the shop and finds that, due to the breakdown of a machine, an order will be delayed, it is discouraging for him to know that a similar machine is standing idle but cannot be used because the small tool equipment is not interchangeable.

Abstracted from talk delivered by L. D. Rigdon, director, Equipment Negotiations, Westinghouse Electric & Mfg. Company, before the Associated Machine Tool Dealers at their recent annual meeting.

Can Rights Be Limited

The confusion and conflict that sometimes exists as to the justice or merits of a particular labor controversy is usually based on failure to realize that the "right" of one person or group is frequently limited by the equally logical "right" of another person or group.

Suppose we enumerate some of these other conflicting "rights":

1. "The right to have a job"—limited by the right of some other person to offer or refuse to offer a job.
2. "The right to work"—limited by the right of others to quit work.
3. "The right to strike"—limited by the right of others to work at terms and under conditions satisfactory to them and to their employer.
4. "The right to picket"—limited by the right of customers and employees to have free and peaceable access to a place of business and employment.
5. "The right to join a union"—limited by the right of others to choose the union they will join or to decline to join any union.

The agitator or partisan usually concentrates on some particular "right" he is interested in at the moment—he confuses issues by neglecting to consider the limits upon his particular "right"—and that limit is represented by the equally valid "right" of other persons. There are two sides to a "right."

Abstracted from an editorial in the National Association of Manufacturers' "Labor Relations Bulletin" for July 15, 1937.

Methods of Holding Work for Milling

Tool engineers sometimes design elaborate milling fixtures, overlooking the fact that special vise jaws may be cheaper and speedier in operation

C. W. HINMAN
Tool Engineer
Kobzy Tool & Electric Manufacturing Company

THE SIMPLEST milling fixture for holding work against the cut is a pair of auxiliary jaws secured in a commercial milling vise. Vise jaws for holding and milling duplicate parts are efficient tools, and are especially economical for the small manufacturer. Next to vise jaws, the simplest holding devices are positive stops used in connection with locking keys, or clamps applied on the work.

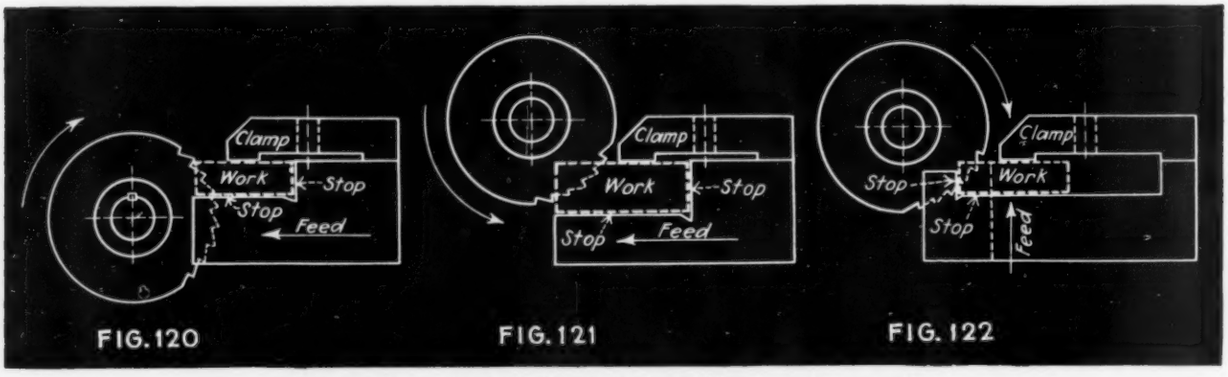
The directional rotation of milling cutters is important. It should be in a direction so that the teeth will cut *against* the travel of the work, and at the same time show a definite tendency to force the work against stops and fixture clamps. In practice, this principle prevents the teeth from disastrously "hooking into the cut." Conditions are rare indeed where these principles can be safely ignored.

Stop Arrangement

In Fig. 120 is shown a "through cut" in which the tooth thrust is against both the work stops, while in Fig. 121 the thrust in a "bottom cut" is against the end stop and the clamp. In Fig. 122, the work is advanced vertically against the teeth, or the cutter may be moved straight down against the work, as on a hand miller. This is also a "through cut," and the tooth thrust is against two positive stops in the fixture. Before designing milling jaws or a fixture, it is best to determine by sketches, the direction for feeding the work in relation to the rotation of the cutter teeth.

Recessed V's in vise jaws have many uses for holding cylindrical work and other sectional shapes. In Fig. 123 is seen a common application in which dimension *X* for the milled flat is constant in each piece of work, regardless of variations in the work diameters.

Auxiliary jaws, being usually parallel, are aligned and guided crosswise, if necessary, by using two guide pins of suitable diameters. The pins are spaced as far apart in the jaws as possible, and are a press fit in the stationary jaw, and guided in hardened bushings through the moving jaw. Auxiliary jaws are usually made



Figs. 120, 121 and 122—Before designing milling jaws, determine by sketches the direction for feeding the work in relation to the cutter teeth, and then lay out stops and clamps for taking tooth thrust

from cold-rolled or machinery steel and pack casehardened, or of tool steel, hardened and ground. An effective design for preventing vertical misalignment is to interfit the jaws as illustrated in Fig. 124.

In Fig. 125 are two cylindrical pieces of work centralized equidistantly in vertical V openings. The purpose is to use a gang of cutters in simultaneously performing the same milling operation on each piece. The side clearance of the moving member in a worn vise usually provides sufficient play to insure clamping both pieces in rigid equalization, if their diameters are within the usual ± 0.003 in. tolerance. To hold four pieces, the principle given in Fig. 126 is useful. The two equalizers are a sliding fit in their slots, and on their arcs.

Controlled Cut Depth

In Fig. 127, angle *A* on the auxiliary jaw is advanced by closing the vise, and thus forces the loose member *B* to register the work against two overhanging positive stops. Spring plungers are arranged to bear against the work at *C* for aligning the piece parallel with the jaws. This type of gaging controls the depth of

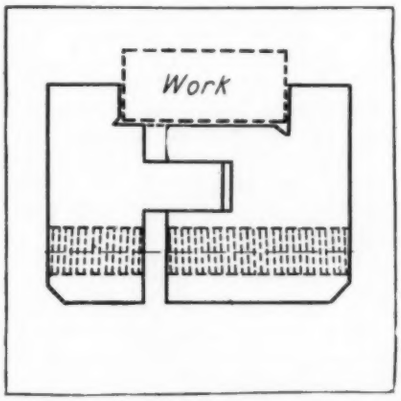


Fig. 124—Interlocking the two vise jaws will prevent their vertical misalignment

the milling cut, and dimension *X* is constant, irrespective of variations in the work thickness. If the work is a round section instead of rectangular as shown, this principle will obtain the same result by extending the overhanging stops.

Auxiliary jaws are convenient for holding thin work such as metal stampings, or thin-rimmed light castings, as seen in Fig. 128. One or more hardened stop pins, as shown, prevent the jaws from buckling the work when the vise is closed too tightly. The jaws have an angular hugging down grip, approximately

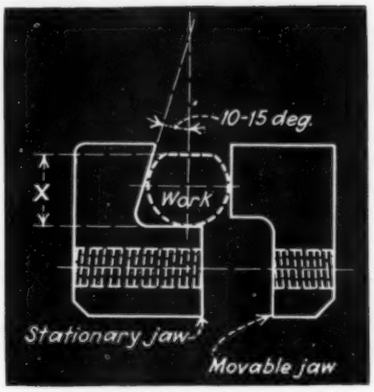


Fig. 123—A recessed V in the stationary jaw will hold cylindrical work varying in diameter and dimension X will always be constant

5 deg., or to suit conditions. The lower edges at *A* are cut at an angle of 45 deg. to clear the $\frac{1}{8}$-in. radial fillet at the corner within the stationary vise jaw. Both members have this angle so that a pair of jaws can be secured either way in the vise.

Machine vises are low in cost, and auxiliary jaws can be quickly made for them. The argument that special fixtures can be opened and closed more quickly than a vise may not be true, because there are commercial vises obtainable operated by quick-action cams, and by compressed air. Swivel vises, and those that can be adjusted to vertical angles, permit making many different angular cuts, and the jaws can be made suitable for holding work up to 8-10 in. long. Work of extra lengths can sometimes be held in two vises arranged side by side. The distance between the vises is made to accommodate the work and cut.

There is no reasonable limit in the height or thickness of milling jaws. If the work is wider than the vise opening, overhanging jaws are designed. The principle is illustrated in Fig. 129. The possibilities in using a milling vise should always be the first consideration before deciding to build a special fixture. This foresight has often saved thousands of dollars.

Foresight Pays

To be sure that a milling fixture is needed before building one, seems an almost unnecessary precaution, but sometimes a grinding or lapping fix-

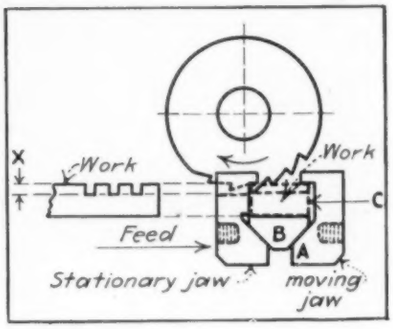


Fig. 127—Wedge B is lifted as the moving jaw closes, and registers the work against the overhanging stops on the two jaws

ture is more suitable for the job. This recalls an instance where a straddle milling fixture was ordered for milling a blade on the end of a short round piece of brass. The blank was machined on an automatic screw machine. The fixture was built and sent to the tool vault, and there it remained until scrapped. It seems that the screw machine foreman was completing this work in one operation. After machining the blank, the slotting arm carried it up in line with a pair of straddle milling cutters, and fed the work between the blades. Of

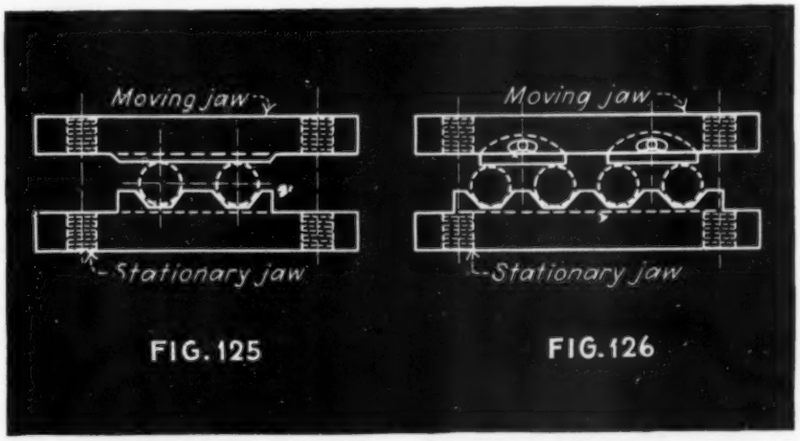


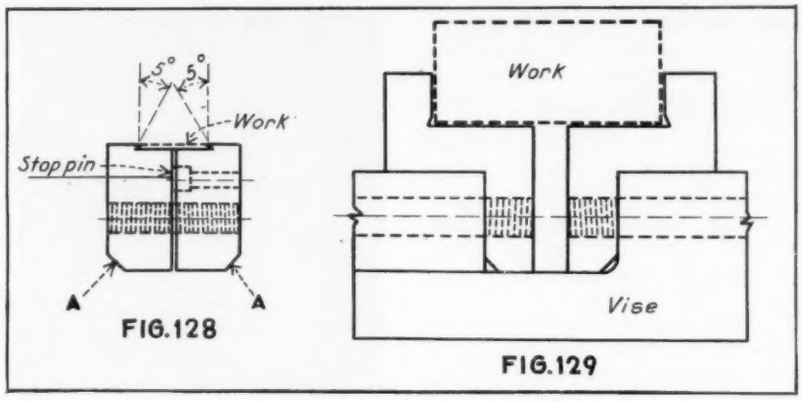
Fig. 125—Two pieces are centralized in the V's, so that a gang of cutters can perform the same operation on each piece. Fig. 126—For holding four pieces it is necessary to add the two equalizers

Fig. 128—Thin work is not buckled because of the stop pin. Fig. 129—Over-hanging auxiliary jaws are used when the work is too large for the vise

course, this happened before the day of tool committees whose business it is to decide what tools are necessary. This job was a peculiar one, it had no precedent, even the screw-machine foreman doubted that it could be done in this way, until he tried it.

—

Part XVII of Mr. Hinman's series on tool design will appear in an early number.



British Labor Laws

THE RECENT wave of strikes in this country has been the cause for a lot of criticism of the "irresponsibility" of American labor unions compared with their British counterparts.

Close study of British legislation shows that there is a mistaken idea in this country that British labor laws are far more comprehensive than is really the case.

Approximately one in every three British workers belongs to a union as contrasted to America's one out of seven to eight workers. The closed shop predominates in only a few industries. Printing is one; a few skilled branches of metal-working industries are also closed shops. No municipal utilities can proclaim a closed shop, nor can they demand it in contracts.

The check-off is completely illegal in Britain. An employer is not permitted to make any deductions from a worker's pay except for those required by law such as for unemployment and health insurance and for old age pensions.

British unions need not be incorporated, nor are they required to account for all funds. However, 80 per cent of the unions are registered which means that they have complied with government regulations which demand that they (1) show an object for organizing; (2) amend their charter rules only according to prescribed methods; (3) have definite provisions for appointment of officers.

This registration is entirely a voluntary move, but it does require that the union has set up a board of directors or trustees who accept the responsibility of representing the union in property and financial matters.

It is illegal to use union funds for political purposes unless they have been specially collected as such from members and held in a special account. Accountings of these political funds, whether created in registered or unregistered unions, must be submitted for audit once a year.

Civil service employees may form their own union, but they cannot affiliate with outside unions.

No Legal Responsibility

British unions are not legally responsible for the observance of contracts and the actions of members. A trade union cannot be sued for damages, except in case of an illegal strike. It is a criminal offense, however, to break a contract of employment where the act may endanger human life or valuable property, or where, in the case of utilities, it may cause injury or danger or grave inconvenience to the community.

Labor and management are not compelled to arbitrate disputes. Most problems are settled by conciliation boards, composed of representatives of both labor and management. If the board fails to reach an agreement, a neutral umpire is called in. In about 50 industries, there are Industrial Councils composed of members from both sides, often not equal in numbers, but equal in voting power.

A sort of "supreme court" has existed in industrial disputes since 1919, with workers, employers, and the general public represented. It is supported by the government, cases are referred to it by mutual consent of parties concerned, and awards are not compulsory. Six similar district counts assist in this work. The Ministry of Labor may also appoint special courts to investigate disputes without any request from the parties concerned.

Two specific laws which outline strikes in very special cases, but definitely limited in application are as follows:

1. In the case of workers in gas, water, electric supply, and local public service plants, any strike or lockout which is a breach of contract is illegal.

2. General strikes, where the aim is to support strike action in any but the industry for which the strikers work, or a strike not connected with conditions of employment in the strikers' industry, and where—in both cases—the aim is to coerce the government or inflict hardship on the community, are illegal.

Criminal Liability

In the case of a general strike, British labor law provides for fixing the responsibility and levying a penalty as follows:

(1) Criminal liability is imposed on all union officials (including all strike committeemen, branch officials, and shop stewards, but not the workmen themselves) who further such strikes. (2) Where a strike is ruled illegal, and unions are found guilty, damages can be levied upon union funds. (3) Under the same circumstances, union members expelled for continuing at work are allowed to claim damages from union funds. (4) In cases where strike action is illegal the attorney-general is empowered to interfere in union affairs by application to court to restrain the expenditure of union funds for strike support.

—

Abstracted from "How British Labor Laws Work". (*Business Week*)

IDEAS FROM PRACTICAL MEN

Progressive Press Tools

JOHN J. McHENRY

PROGRESSIVE press tools for producing the part *A* from strip stock, using all the stock without waste, excepting the slugs from piercing and notching, are shown in Fig. 1. The die *B*, stripper *C*, stock guide *D*, first, second and third stops *F*, *H* and I and the lower shear *K* are all attached to the die-shoe and comprise the lower unit. The punch-plate *L*, piercing punches *M*, notching punches *N*, pilots *O* and the upper shear *P* are attached to the punch-holder and comprise the upper unit.

The sequence of the first three operations is shown in Fig. 2, the view at the left representing the stock after the first descent of the ram, that in the middle after the second descent, and that at the right after the third descent.

In operation, the stock is placed in guide *D* and is advanced to the first stop *F* which is held in position by raising its tail, otherwise it will lift clear of the die-shoe, due to its unbalanced construction. On the first descent of the ram the end of the stock is notched and the three round holes are pierced.

The stock is then advanced to the second stop *H*, which is also manually operated, otherwise it would drop below the die face. On the second descent of the ram pilots *O* align the stock accurately and the operation is a repetition of the first, but in this instance the two central notching punches cut the outlines completely and the stock is notched on the edges.

The stock is then advanced to the last stop *I*, and on the third descent of the ram, in addition to the piercing and notching operations just described, two complete pieces are cut off by the shears *K* and *P*, one on each side, leaving a projecting piece in the center. On the fourth and succeeding strokes of the ram, three finished parts are cut off, one from each side and the projecting one in the center.

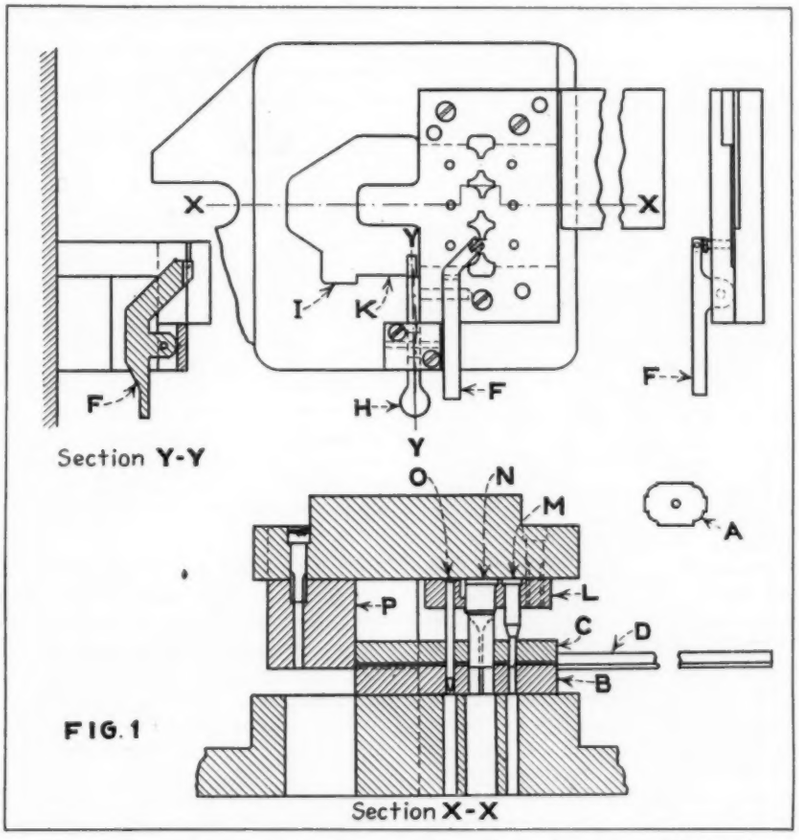


Fig. 1—The parts are produced from strip stock of the correct width and there is no waste other than the slugs from piercing and notching

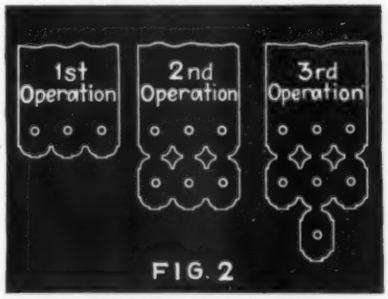


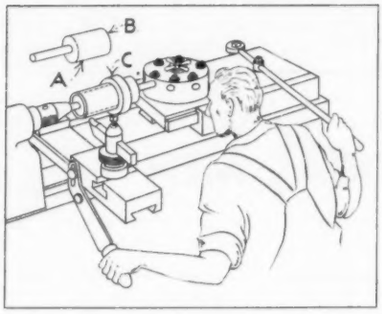
Fig. 2—Sequence of the first three operations. The fourth cuts off three complete pieces, one from each side and the projecting one in the center

Large Shells Trimmed in the Turret Lathe

CHARLES H. WILLEY
Superintendent of Manufacturing
Hoyt Electrical Instrument Works

In the manufacture of the 4-in. diameter drawn brass shells used for cases for our meters, instead of trimming them in the press with pinch-off tools we do the trimming in a turret lathe, as shown.

The mandrel *A*, having a shank to fit the collet in the lathe spindle, has the outer end turned to fit the shells, the face *B* being slightly knurled to prevent them from slipping when their inner bottoms are pressed against it.



The shells are held on the mandrel and are prevented from slipping by a ball-bearing pressure plate mounted on a shank held in the turret

Mounted in one of the holes in the turret is a shank carrying on its outer end a ball thrust bearing to which is attached the pressure plate *C*. In use, a shell is slipped over the outer end of the mandrel. The turret is advanced to bring the pressure plate into contact with the shell's outer bottom so that its inner bottom is held tightly against the knurled face of the mandrel.

The cross-slide is operated to cause the tool to trim the shell, while steady pressure is applied to its outer bottom by the lever of the turret slide. The set-up is easy to operate.

Gage for Checking Driving Wheels

F. M. A'HEARN

The second sentence of the second paragraph of my discussion of the above subject (*AM*—Vol. 81, page 620) should read "On locomotives having long wheel bases it is common practice to set the tire flanges on the front and rear drivers 4 ft. 5⅛ in. back to back, and the flanges on the tires of the intermediate drivers 4 ft. 5¼ in."

Wear is usually more rapid on the front and back flanges than on the intermediate flanges of locomotives having four pairs of flanged tires. This is the reason for setting front and back tires ⅛ in. narrower than the intermediate.

Kinks Did It—Why?

GEORGE H. COOPER

The extended discussion of the article under the above title illustrates the knowledge that may be obtained from many different views on the same subject. The comments by N. V. Smith (*AM*—Vol. 81, page 580) are exceptionally good. The "hydraulic" method may be carried further by actually taking a cut on a piece of scrap steel with an old, dull cutter while the hydraulic pressure is maintained. As a precaution, the overarm center should be placed about 0.025 in. loose on the outer center of the arbor.

We have had versions on this subject from practically a stick of dynamite to a flaxseed poultice and they have been very interesting. May we have more complete exchanges of ideas on original subjects. It is instructive and a pleasure to follow them.

Fixture for Truing Wheels to a 45 Deg. Angle

J. R. WHITTLES

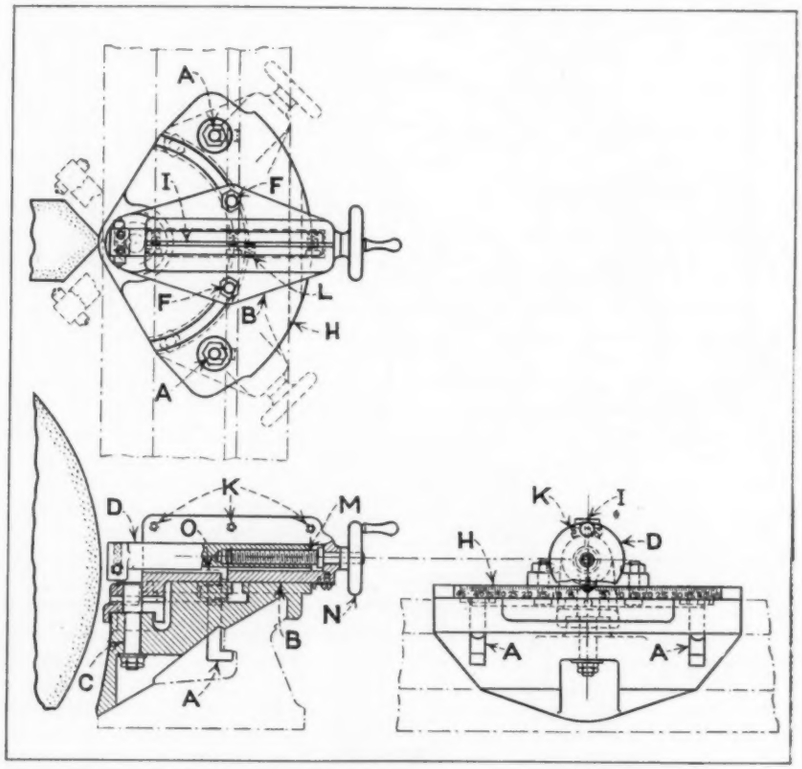
The fixture illustrated is for dressing or truing both faces of abrasive wheels at angles of 45 deg. or less each side of center. Two diamonds are used, one for each angle.

Because of the shape of the grinding machine table, there is not enough space between the top of the table and the centerline of the grinding wheel for the operation of the fixture. This makes it necessary to offset both the diamond tool holder and the swivel point of the fixture to bring the diamond to the same plane as the grinding wheel centerline. The machine's micrometer wheel feed is used in positioning the wheel in and out and for feeding the grinding wheel into the diamond while truing. Hand traverse of the table is used for placing the fixture in the center of the face of the wheel after the operator has placed the fixture as near to the center as possible.

The diamond nibs are set in angular holes in the diamond tool holder. These holes are about 5 deg. above horizontal so that the operator can turn the diamond nib a little when worn and thus present a new surface of the diamond to the wheel.

The body of the fixture is clamped to the grinder table by two hook bolts at *A*. Plate *B* swivels about pivot *C* as a center and carries the offset diamond holder *D*, similar to the tailstock spindle of a lathe. The swivel plate is locked in position by the two bolts *F* having heads to fit a circular T-slot in the body. It carries a pointer to indicate the angle at which the diamond holder is set, reading from graduations at *H* on the body.

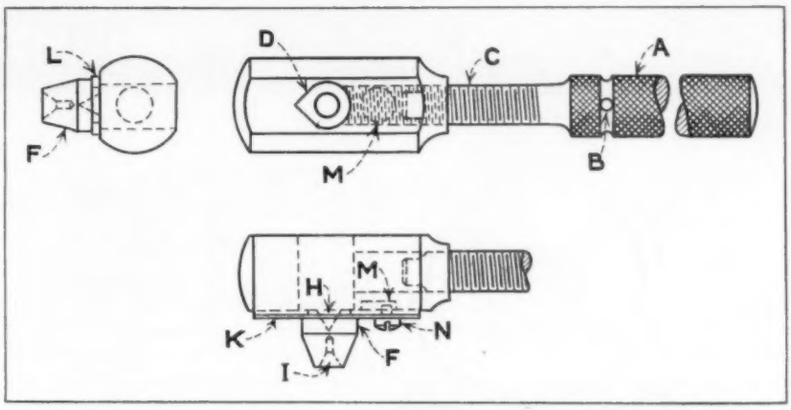
At the top of the bearing for the diamond holder is a slot at I for taking up wear by springing the metal by the three screws *K*. The slot is filled with a strip of felt to exclude grit or dirt from the bearing. The



Truing or dressing abrasive wheels at an angle calls for a fixture that can easily be set at the required angle each side of the center

two setscrews *L* oppose the tightening screws and are set so as to prevent the bearing from being set up too tightly.

The feed screw *M* is operated by the handwheel *N* and feeds the diamond holder in or out according to which way it is turned. The diamond holder is guided by a feather key at *O* to keep the diamond settings in position as the holder is traversed.



The inner center of a piece centered at both ends acts as a cup center for the shanks of tools. The outer center receives the tailstock center of the lathe

Welded I-Beam Horses

W. J. TANGERMAN
Shop Superintendent
Union Metal Products Company

Many sheet-metal fabricating plants use portable horses on which to pile sheets. They are usually made by welding channel legs to I-beam tops, as shown in Fig. 1. The channel flanges are cut off for a distance equal to the depth of the I-beam web and the lower web of the I-beam is coped to permit welding along the bottom of the joint. Obviously, removing these flanges weakens the members and involves greater time in the making.

We have recently simplified the design of our horses as shown in Fig. 2. The flanges of the channel legs are not cut away and the bottom flange of the I-beam is left intact. Seam welds are made along the joining of the webs and the meeting of the flanges. It will be seen that the lower flange of the I-beam acts as a spreader for the legs and that the upper ends of the channel flanges are welded to the upper flange of the I-beam, resulting in a sturdy, rigid joint that is quickly made. Since no flanges are either cut away or coped, strength of the individual members is retained.

Feet, as usual, are welded to a spreader plate to permit the assembly to be set on soft ground.

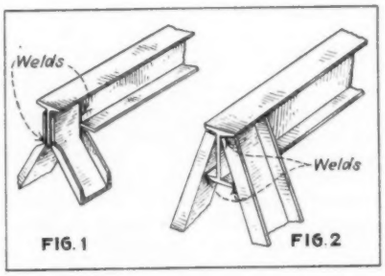


Fig. 1—The members are weakened by cutting away the flanges. Fig. 2—Leaving the flanges intact and welding as shown results in a stronger, better job

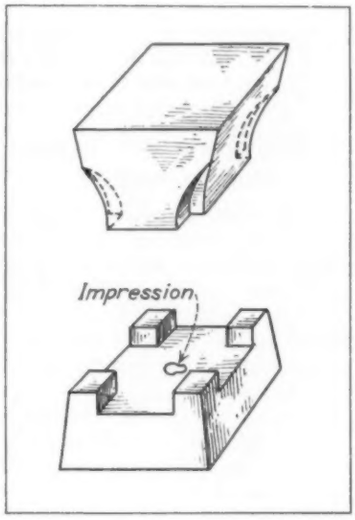
Drill and Reamer Holder

CHARLES C. TOMNEY
Chief Tool Designer, Carrier Corporation

Referring to the article under the above title by C. F. Fitz (*AM*—Vol. 81, page 291), I am submitting a drawing of a holder that was made by my father and given to me when I was an apprentice. While this holder is more expensive than the one described by Mr. Fitz, I think it is better because it is not necessary to use a cup center in the tailstock. Where a tap or a reamer has a center in the shank it is better to use the holder for drilling and use a regular tap wrench for tapping and reaming because a more nearly balanced turning movement can be had with the two handles of the wrench.

Referring to the illustration, the handle *A* is knurled and is drilled at *B* for a pin to be used as a lever for tightening the tools. It is threaded at *C* to fit the tapped hole in the body. The hole *D* is of the same shape as that in a lathe dog and gives a 3-point bearing for the tools. The piece *F* is centered at both ends, center *H* serving as a cup center for uncentered shanks of tools, while center I receives the tailstock center.

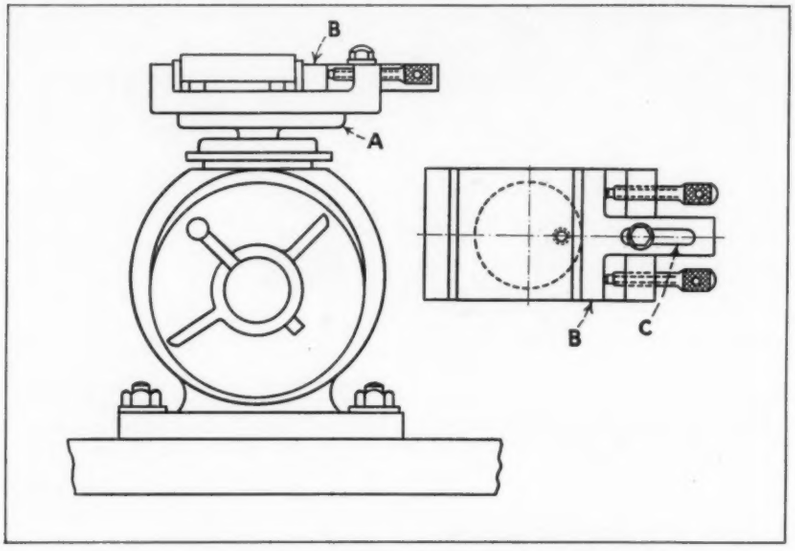
Piece *F* is riveted to the slide *K* which is dovetailed at *L* for a sliding fit in the body. The flat-bottomed hole *M* is to permit the small screw *N* to project into it to prevent the slide from falling out when there is no tool in the holder. Hole *M* is large enough to permit the sliding member to slide far enough for piece *F* to center the smallest drill practicable to be used in a holder of this type. By taking out screw N and the sliding member, the holder can be used in the same way as the one described by Mr. Fitz.



Simplified Method of Making Force Blocks

H. R. LE GRAND

Force blocks for small coining and swaging operations are ordinarily made with a round depression sunk in the lower block and a round mating stub on the upper member. A simpler and cheaper method is to mill two slots at right angles in the lower block and to notch in the corners of the upper one to fit. One shop mills the slots 1 in. wide, the work being indexed 90 deg. between cuts. For the upper block the two cutters are spaced 1 in. apart and the notches are quickly cut to the correct depth. Four cuts are taken, one for each face, to insure that the lugs are all 1 in. wide. The chief advantage of this method of making force blocks is that they are stronger and have better alignment than usual. The shop that is using this method reports considerable savings by its use.



A small vise attached to a tang fitting the spindle of the dividing head permits easy handling of a number of light tool jobs

Dividing Head Vise

PETER L. BUDWITZ

A convenient accessory for use on the dividing head of a universal milling machine is shown in the accompanying illustration. The device, a specially constructed small vise, is attached to the enlarged head *A* of a shank fitting the spindle of the dividing head.

By the use of this vise, a variety of light tool jobs can be easily handled, including the boring of accurately spaced holes and the machining of semicircular and other openings. By setting the dividing head at an angle, the drafts in die openings can be conveniently machined.

Both members of the vise are made of machine steel and the facing strips of both jaws are hardened and ground pieces of tool steel. The rear end of the vise has an opening to receive the tang of the movable jaw *B*. The slot *C* in the tang permits movement of the jaw and receives a capscrew for holding it down. By removing the movable jaw, parts of various shapes can be held by means of suitable clamps and blocking.

Clamping the work is accomplished by two knurled-head screws having crossholes for pins used for levers.

Washing Chips From Metal Parts

BRUCE MacINTOSH

A small, perforated sheet-metal basket riveted and soldered to the inside of an ordinary galvanized-iron pail will save time in washing the chips from turret lathe work and will conserve the flushing oil. The chip covered parts are put into the basket and are flooded with flushing oil, which washes off the chips and drains into the pail. When the pail is full, the flushing oil is poured into a container and is used over again.

Measuring a Hidden Outside Diameter

LAURENCE F. SOUTHWICK

We were recently asked to make a number of pipe swivels like that shown in Fig. 1. These were to be made exactly like a sample assembly, which was not to be destroyed.

Measurement of the diameter of the shank *A* presented a problem, as the only available portion for measuring was at the clearance *B* between the two hexagons. This clearance amounted to 0.010 in.

Armed with a couple of pieces of 0.008 in. feeler stock a foot long that happened to be handy, a small square, three small parallel clamps and my handbook of trigonometric tables and formulas, it was a simple matter to construct the right triangle shown in Fig. 2. The part to be measured was slipped into the apex of the triangle.

Essential lines were then sketched as shown in Fig. 3, and symbols were assigned. Obviously, the true diameter is not given by a direct measurement across the points *A* and *B* where the shank touched sides *b* and *c*.

However, a line bisecting the angle β will pass through the center of the part to be measured and a perpendicular from this point to the point of tangency β will coincide with and, therefore, be equal to the required radius.

From Fig. 3, it is evident that $\cos \beta = \frac{b}{c}$, $\sin \beta = \frac{b}{c}$ and $\tan \frac{\beta}{2} = \frac{r}{a}$

It can be shown that:

$$Tan \frac{\beta}{2} = \frac{1 - \cos \beta}{\sin \beta}$$

Substituting their equivalents for the angular functions:

$$\frac{r}{a} = \frac{1 - \frac{b}{c}}{\frac{b}{c}} = \frac{c - b}{b}$$

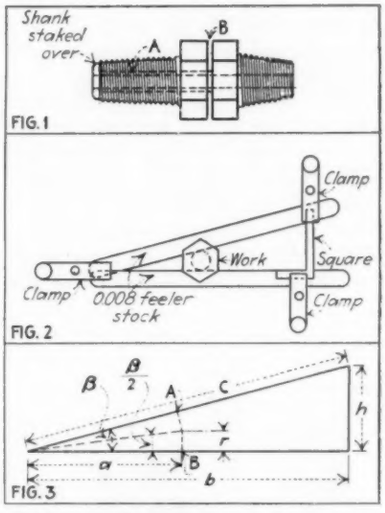
Solving for r:

$$r = \frac{a\,(c - b)}{b}$$

It becomes necessary, therefore, only to measure *a*, *b*, *c*, and *h*, and make the necessary substitutions in the above formula. In case *b* is made equal to 1 in. (or whatever unit is being used), the formula reads:

$$r = a\,(c - b) \text{ when } b = 1$$

The only difficulty in this method is the accurate measurement of the distance *a*. In the case mentioned it was necessary only to arrange the sides of the hexagon perpendicular to the base of the triangle, the lower point of the hexagon then giving the location ot point *B*. Where the larger portion of the part is a circle concentric with the circle being measured it will be a simple matter to drop a tangent from each side of the large circle. Point *B* then will be halfway between the two tangent lines.



Hidden outside diameters often can be measured through application of trigonometric formulas

Finishing Welds in Stainless Steel

ECONOMICAL grinding, polishing and buffing of stainless steel require special care in the methods employed and the abrasives selected because of the peculiarities of the material. By stainless steel is meant 18-8, but with few exceptions the straight chromium steels may be handled the same way. Reproduction of the following information from Oxy-acetylene Tips of May, 1937 is now made possible through the courtesy of the Linde Air Products Company.

The toughness of the 18-8 chromium-nickel stainless steel often calls for a relatively coarse, open and porous wheel. The grains of such a wheel will break off before they be-

TABLE I

SUMMARY OF RECOMMENDATIONS OBTAINED FROM TWELVE ABRASIVE OR STEEL COMPANIES ON FINISHING STAINLESS STEEL WELDS

(Depending on the type of weld and the finish desired, a selection from these operations is made)

OPERATION	ABRASIVE	GRIT NO.	BOND OR MATERIAL	SURFACE SPEED FT. PER MIN.	WHEEL SIZE DIAM., IN.	WHEEL SIZE THICKNESS, IN.
Rough-Grinding	Aluminum oxide	16-30	Rubber	6,500-9,500	6-30	¾-1
	Aluminum oxide	14-30	Resinoid	9,000-10,000 (See Safety Code)	6-8	¾-1
	Silicon carbide	30	Resinoid	9,000-9,500	3-6 (Cup-shaped) 3-14 (Straight)	1.25-2
	Aluminum oxide	24	Vitrified	5,500-6,000	6-8	¾-1
	Silicon carbide	24	Vitrified	6,000	—	—
Finish-Grinding	Alumina	36-60	Rubber or resinoid	9,500	6-8	¾-1
	Silicon carbide	46	Resinoid	9,000-9,500	3-6 (Cup-shaped) 3-14 (Straight)	1.25-2
	Alumina or silicon carbide	36-46	Vitrified	6,000	6-8	¾-1
POLISHING:						
Rough-Polishing to remove blemishes	Dry alumina	60-80	Muslin or canvas*	6,000-8,000	—	—
Greasing	Alumina with tallow or lard-oil	100-120	Muslin	6,000-8,000	—	—
Dry Fining	Alumina	150	Muslin	6,000-8,000	—	—
Grease Fining	Black emery or alumina	180	Walrus or muslin	6,000-8,000	—	—
Grease Coloring (for mirror finish)	Emery or alumina with oil	220	Walrus, sheepskin or felt	6,000-8,000	—	—
	Flour emery with oil	to 320	Walrus, sheepskin or felt	6,000-8,000	—	—
SPECIAL FINISHES:						
Tampico Brush	Pumice and kerosene	—	Stainless steel wire brush	6,000-7,000	—	—
Comb. Polish and Buff	Patented compound	—	Sewed loose or pocket type of muslin buffing	7,000-7,500	—	—
BUFFING:						
Cutting-Down	Tripoli composition	—	High-count unbleached muslin	10,000-12,000	—	—
Color-Buffing	Chromic oxide or unfused alumina	—		9,000-12,000	—	—

NOTE:—The grade or "hardness" of the grinding wheel (not given in this Table) should also be considered.

*Cloth polishing wheels are usually made up with a hide glue.

Finishing Welds in Stainless Steel

come badly dulled or loaded from use.

Straight high-chromium steels demand a finer grit with relatively close spacing, and a little harder wheel can be used than on annealed austenitic chromium-nickel steel. If the 18-8 austenitic steels are especially hard, however, it is often desirable to use a harder silicon-carbide abrasive rather than an aluminum oxide abrasive.

Wheels for Rough Grinding

Welds usually require larger grits for roughing operations than are used for the first operation in grinding sheet stock as it comes from the mill. Standard cylindrical wheels are generally used, although on flat seams a cup-shaped wheel will give more satisfactory results with less tendency to gouge the adjoining surface.

A wheel of 20 to 24 grit size produces the roughest type of finish, and is usually recommended for the first cut at least. The grade should be on the soft side. This will prevent burning and yet will facilitate the rapid removal of stock. If desired, a 36 or even 46 grit wheel can be used. It will not remove metal quite so rapidly but will leave a much better finish. Depending upon the working conditions and facilities of the grinding operator, wheels from 3 to 8 in. have been found suitable.

Intermediate grinding may be done with the same type of wheel that is used for the rough grinding. A new type of wheel that uses emery cloth strips for grinding and polishing can also be used.

About 90 per cent of the grinding on stainless steel welds is done with portable grinders. The remaining 10 per cent is accomplished by means of floor stands and polishing jacks.

There are three reasons why care should be used in not allowing stainless steel welds to become too hot while grinding. First, the value of the weld when seriously overheated is lessened; second, the "color" or final polishing would not be in accord with that of the balance of the article; and, third, discoloration or "heat-tinting" would be likely to occur should temperature exceed 400 F.

To avoid excessive heat generation, the pressure of the grinding wheel against the work should not be too great. The proper pressure will be determined by the workman in each case. Relatively coarse and soft wheels tend to produce a cooler grinding action. Cooling by means of a spray of water on the opposite side of the weld is a help.

If stainless-clad steel has been welded, it is best not to attempt to grind the welds off flat, but merely to smooth them off. Should flat welds be essential, the work should be done by an expert provided with a grinding machine in first class condition.

Polishing Equipment

Polishing wheels should have a soft cushion type of buff, well ventilated to lessen the possibility of overheating. If previously used on ordinary carbon steel or brass they should never be used on stainless steel unless thoroughly redressed, since steel or brass contamination might bring about corrosion.

Many operators recommend changing at No. 180 grit from artificial abrasive to Turkish emery, because it produces a higher polish. It contains some iron oxide, however, which would have to be removed, and many fabricators are therefore using aluminum oxide abrasives, both fused and unfused, for all the operations on stainless steel. Fused alumina will cut faster than unfused alumina as a cutting down and buffing compound.

In polishing, the operator should remember that the metal is generally harder and tougher than other alloys. It becomes hardened by mechanical working and the color and corrosion resistance of unstabilized stainless steel are affected by exposure to excessive heat. The metal has a high coefficient of expansion. Except for such modifications as are made necessary by the above mentioned properties, the polishing of stainless steel is done much as is the polishing of any other alloy.

If the weld requires annealing, or if pickling is necessary, these operations can be carried out without destroying the polished finish imparted to the weld. Surfaces finished with rouge or emery should be pickled by immersion for 15 to 20 min. in a warm nitric acid solution whose specific gravity is approximately 1.15, corresponding to 25 per cent HNO_3. The steel should then be thoroughly washed with hot water, and dried.

There has been a decided reduction in the cost of buffing stainless steel in contrast to the first efforts in polishing and buffing this metal. This reduction has resulted from improvements in buffing compounds, and especially from more time and effort spent in the previous polishing operations.

For the coloring operation a precipitated alumina buffing compound can generally be used to advantage. It should be free not only from ferric oxide, but also from copper and sulphates of all kinds. Green chromic oxide used on a cotton cloth sectioned wheel is sometimes preferred for the final buffing, and talc is also used. Any discoloration from heat or flux along the weld can be removed with tin oxide abrasive if levigated alumina seems to be too harsh.

The high coefficient of friction of chromium-nickel stainless steel frequently results in localized heating during buffing. A sulphur-containing buffing compound must therefore be avoided, or the action of the sulphur on the nickel in the alloy might cause tarnishing.

Lubricants Used

The chief consideration in buffing 18-8 is to avoid deep scratches and overheated buffs. Tallow, which is a solid at room temperature, or some other lubricant should be used on all operations except the first and final coloring. Tallow modifies the action of the abrasive grit to produce a satin-like finish. Stearic acid produces a somewhat higher color. The best classes of finishes are produced by first treating with tallow, and following with stearic acid and fresh abrasive of the same size. Beeswax or carnauba wax is often used for a still higher color and burnished appearance.

CHIPS

Washington

Roosevelt, indifferent to public reaction against his court-packing scheme, plans to push it through next Congress . . . Guffey, New Deal Senate mouthpiece, threatens insurgent Democratic Senators while Farley says that reprisals never pay in politics . . . U. S. Treasury deficit larger than last year's, debt exceeds $37,000,000,000 . . . Roosevelt and Hopkins promise no further W.P.A. lay-offs except for cause . . . Heavy adverse trade balance for first six months likely to give U. S. first yearly adverse balance in 44 years . . . Hull advises that negotiations for trade treaty with Czecho-Slovakia will be opened shortly.

Foreign

Spanish rebels under Italian direction capture Santander . . . Japanese encounter stronger Chinese military resistance than had been expected, call entire army into service, blockade long stretch of Chinese coast but exempt neutral ships from interference unless they carry contraband . . . Great Britain warns Franco against further attacks on merchant ships, Turkey sends like warning . . . Hungary to start repayments on war debt . . . Japanese aviators shoot and bomb British ambassador to China as his car crosses war zone . . . Drop more bombs on civilians and kill many hundreds . . . British government sends sharp note to Japan demanding apologies and insisting that the Japanese cease attacks on civilians . . . Nazis prepare to celebrate "lowest unemployment record in the world" . . . Chinese planes bomb Dollar liner, quick apologies offered, U. S. merchant ships ordered out of Shanghai by American naval commandant . . . Tokyo worried by non-aggression treaty signed by Russia and China.

Industry

Lewis dictates compromise in fight between the right and left wings of U.A.W. at Milwaukee convention, Martin promises closed shop and Ford contract, convention votes to use sitdown technique wherever it is "needed" . . . Green says U.A.W. is under Communist influence, Lewis warns it to let politics alone, Dubinsky defends Communist members . . . Railway labor orders strike as conferences break down after executives say pay increases demanded would ruin railroads, Mediation Board steps in . . . A.F. of L. fights C.I.O. for control of state labor federations, loses West Virginia . . . N.L.R.B. cites Bethlehem Steel and American Radiator for infractions of Wagner Act . . . A.F. of L. claims 3,600,000 paid-up members, gain of 1,000,000 in year, scoffs at C.I.O. claim of 3,000,000 . . . Ohio judge enjoins United Shoe Workers from interfering with individual contracts of workers, strike placards ordered removed . . . N.L.R.B. ignores Northern Pennsylvania Federal District Court order upholding signed closed-shop contract between National Electric Products Corp. and A.F. of L. affiliate, and orders an election on C.I.O. complaint.

Indicators

Steel production holds steady above 83 . . . Electrical power output remains high . . . Business Week's index climbs half a point to 79.2.

INDUSTRIAL REVIEW

WHILE some industrial centers report a good volume of orders for machinery and machine tools and plenty of inquiries to work on, others are still looking for the autumn revival that is confidently expected. There is reason to believe that the big buyers of equipment are still rather strongly in the market while the little fellows have been doing practically nothing for some weeks. Various theories are advanced to explain what is going on. Some distributors believe that such political factors as failure to balance the budget are shaking confidence and causing potential buyers to hold off. Others feel that the threat of renewed labor troubles as soon as the summer lull is over threatens to interfere seriously with the regular course of business. Still others attribute lack of action on the part of buyers to fears that the far eastern or spanish disturbances may be fanned into a general conflagration and eventually bring this country into the fighting.

NEW ENGLAND reports a vigorous revival of orders since the adjournment of congress and is again complaining about deliveries. August business in the New York territory was satisfactory and is expected to improve. Fall business in Philadelphia has not as yet begun to open up, but inquiries are improving daily. In Pittsburgh also inquiries have been decidedly better although orders have been generally on what is considered a summer level.

CLEVELAND reports fair business in August with improvement toward the end of the month. The middle of September is set in the minds of Detroit distributors as the time when business will become active there along with the resumption of full scale production in the automobile plants. Inquiries are better in Toledo with deliveries disappointing many prospective buyers. Cincinnati August business seems to have been rather better than had been expected for a summer month and fall prospects are promising. Manufacturers still have considerable backlogs to work on.

THE SUMMER slump is still on in St. Louis although dealers there report that August was a pretty good month. Chicago business continues good but there is evidence that the political uncertainties have dampened the buying enthusiasm of a lot of the smaller machinery users. The bigger ones are buying steadily. August orders for machinery in Milwaukee were good but the volume of inquiry has been dropping off which does not promise very much of a revival in the fall.

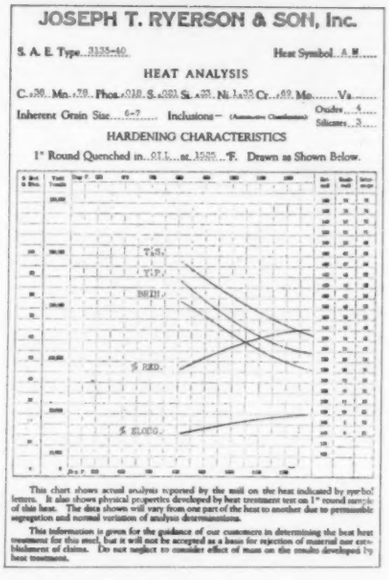
Ryerson Adopts Certified Steel Plan

Joseph T. Ryerson & Son, Inc., Chicago, manufacturer of iron, steel and machinery, on September 1 announced the Ryerson Certified Steel Plan. According to this plan, the company will select entire heats of alloy steel which come within certain narrow analysis limits. These limits are to be more rigid than those required by S.A.E. standards. The selected heats will be tested for chemical and heat-treatment characteristics and complete data on the heat will be filed. Bars made from the heat will be marked. As they are purchased, data on their qualities will be furnished to the buyer.

Data is to be forwarded prior to the delivery of steel by means of one of two simplified charts. Charts for carburizing steels will give the analysis of the heat, McQuaid Ehn grain size, cleanliness rating, and the results of a carburizing test on a standard sample. Charts for steels of higher hardening characteristics which must be quenched include the analysis, McQuaid Ehn grain size, cleanliness rating, and curves representing tensile strength, yield point, elongation, Brinell hardness, etc., as developed by test specimens quenched at a suitable temperature for the analysis and drawn to various temperatures.

This plan is intended to give the steel user a material which can be accurately controlled in future heat-treatment and to provide sufficient information to carry out heat-treating processes without expensive preliminary tests.

Bonded Steel—**Joseph T. Ryerson & Son, Inc., select good heats of steel, analyze them and mark the bars to suit. Whether purchase is several bars or several tons customer receives advance information on standard charts as to the exact characteristics of steel he has to deal with. One chart is used for carburizing, another for quenching steels**


JOSEPH T. RYERSON & SON, Inc.

S. A. E. Type...3135-40 Heat Symbol...A.M.....

HEAT ANALYSIS

C..v36..Mn..v78..Phos..v018..S..v021 Si..v25..Ni..1.v35 Cr...v62..Mo.....Va.....

Inherent Grain Size....6-7..... Inclusions— (Automatic Classification) Oxides...1.....

Silicates...2.....

HARDENING CHARACTERISTICS

1" Round Quenched in...Oil...at...1525...°F. Drawn as Shown Below.

This chart shows actual analysis reported by the mill on the heat indicated by symbol letters. It also shows physical properties developed by heat treatment test on 1" round sample of this heat. The data shown will vary from one part of the heat to another due to permissible segregation and normal variation of analysis determinations.

This information is given for the guidance of our customers in determining the best heat treatment for this steel, but it will not be accepted as a basis for rejection of material nor establishment of claims. Do not neglect to consider effect of mass on the results developed by heat treatment.

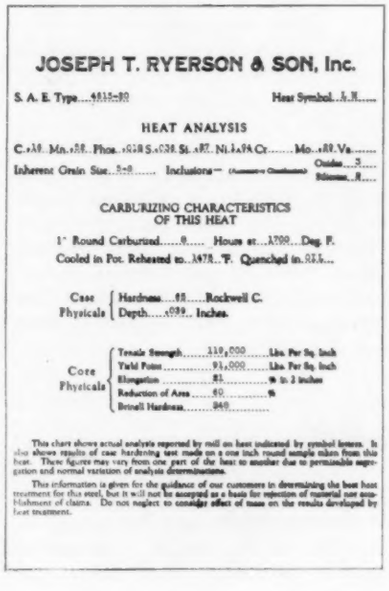
Liberal Viewpoints Expressed at Silver Bay

The promotion of constructive relations in industry was discussed from a broad social viewpoint and with a philosophic approach on the part of almost all speakers participating in last week's conference on Industrial Relations at Silver Bay, Lake George, N. Y. 450 representatives of labor, management, government and education discussed the matter of labor problems in terms of national prosperity and mass purchasing power, rather than the everyday problems which confront the busy personnel department.

James W. Hook, president, Geometric Tool Co., advocated amendment of the Wagner act. He said that industry should ask for this amendment to make real bargaining possible. Labor should join with employers in the effort to prevent the law from becoming one-sided and to establish a fair and equitable national labor policy by defining unfair bargaining practices and making both sides responsible under the law. Mr. Hook spoke on securing mutual confidence of employer and employee, that industry should take more interest in the training of the young, and also favored the adoption of other plans for taking care of employees.

It was the opinion of Dr. Isidor Lubin, Commissioner of Labor, that the government had a function in the industrial process as no other organization or institution is strong enough to make those employers who have only poorly developed social consciences, and who will go to extreme lengths to increase profits, conform to standards observed by the socially-minded industrialists.

B. C. Heacock, President, Caterpillar Tractor Co., in an address presented by L. B. Neumiller, Director of Industrial Relations, Caterpillar Tractor Co., presented the company's experiences in collective bargaining. Without attempting to evade the National Labor Relations Act the writer's firm developed a rather unique system of handling labor problems. Having interpreted the law to mean that there should be discussions between representatives of management and agents appointed by employees for the sincere and honest purpose of discussing any subject concerning wages, hours, or working conditions, and believing that unless or until one agent has a majority of proxies that all agents may and ought to be called into every conference. This has been done by the company. All meetings are open and any faction may take part in the deliberation and discussion and the entire transactions are reported within 24 hours to all employees.


JOSEPH T. RYERSON & SON, Inc.

S. A. E. Type...4615-20 Heat Symbol...A.N.....

HEAT ANALYSIS

C..v16..Mn..v58..Phos..v018 S..v036 Si..v27..Ni..1.v94 Cr.....Mo..v89 Va.....

Inherent Grain Size..5-8..... Inclusions— (Automatic Classification) Oxides...3.....

Silicates...R.....

CARBURIZING CHARACTERISTICS OF THIS HEAT

1" Round Carburized.....9..... Hours at...1700...Deg. F.

Cooled in Pot. Reheated to..1475..°F. Quenched in..Oil...

Case Physicals	Hardness	62	Rockwell C.
	Depth	.039	Inches.
Core Physicals	Tensile Strength	110,000	Lbs. Per Sq. Inch
	Yield Point	91,000	Lbs. Per Sq. Inch
	Elongation	23	% In 2 Inches
	Reduction of Area	60	%
	Brinell Hardness	248	

This chart shows actual analysis reported by mill on heat indicated by symbol letters. It also shows results of case hardening test made on a one inch round sample taken from this heat. These figures may vary from one part of the heat to another due to permissible segregation and normal variation of analysis determinations.

This information is given for the guidance of our customers in determining the best heat treatment for this steel, but it will not be accepted as a basis for rejection of material nor establishment of claims. Do not neglect to consider effect of mass on the results developed by heat treatment.

DETROIT LETTER

Sloan optimistic about 1938 . . . Companies spending to save . . . Increased capacities expected to reduce overtime . . . Studebaker scraps 1000 tools . . . Willys to be the only small car of the year . . . Zephyr may be changed

DETROIT—As the new automotive season approaches, some motor car executives have grave doubts whether the industry in 1938 will be able to repeat its superb performance of this year. Five-million-car years have been scarce in the past and there is little reason to believe that they will become common in the future.

There are many favorable factors to support the belief that next year's sales will be as good as this year's—a bumper farm income, sustained industrial employment, the willingness of people to spend their money. To offset these factors, however, are stiff car price increases. It doesn't take much hiking of prices to make a good many people decide to drive the old car another six months or year. So the more conservative observers now are saying that production next year may fall some 500,000 units short of the 1937 total. President Sloan of General Motors is not among the ranks of the pessimists. He said the past week that 1938 would be as good as 1937.

50-Cent Cylinder Blocks

If a slight recession should occur, it would have little or no effect on equipment buying in the months ahead. Car makers are determined to reduce costs by modernizing their plants and intend to spend large sums for that purpose. The savings thus effected are amazing. One company, for example, will shortly be able to machine a cylinder block for 50 cents, when its new production line is completed, whereas the present cost is 80 cents.

The purpose of some machinery-buying programs is not only modernization, but also expansion of plant capacity to a point where all manufacturing can be done in a 40-hour week. Thus payment of overtime will be eliminated. Such a program is being carried on extensively in Chrysler. The Dodge Division has expended some $400,000 on enlarging capacities of its engnie and rear axle lines, while Plymouth, Chrysler-Jefferson and Chrysler-Kercheval have added to their facilities. De Soto is constructing a third story on its assembly building, is lengthening its chassis and final assembly lines and is installing new banks of presses.

Studebaker is paring costs by installing more modern equipment. In its engine machining department it has spent around $500,000 for new tools; still greater expenditures will be made the coming year. Recently Studebaker has sold over 1000 old machine tools as scrap.

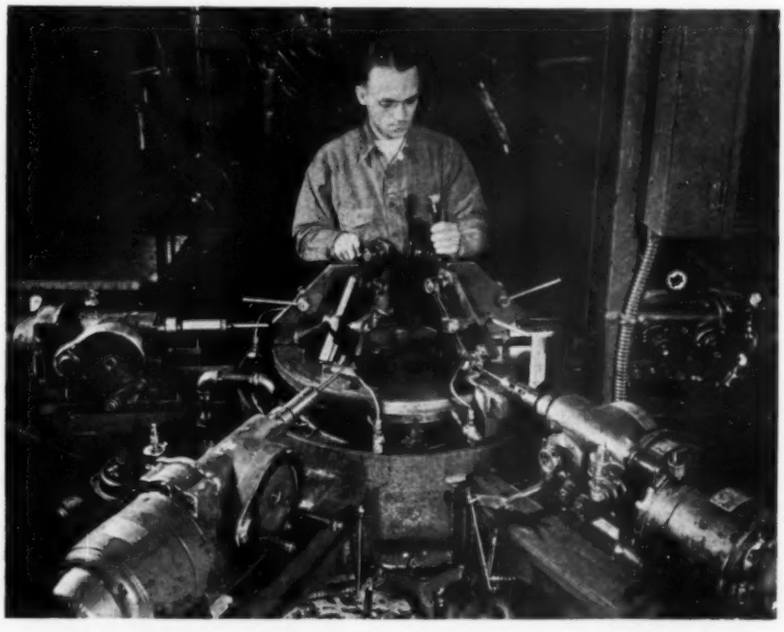
Despite absence of sensational developments for '38, there are some notable improvements. If reports are true, Lincoln-Zephyr will entirely divorce itself from the Ford V-eight. Instead of the Ford transmission, the Zephyr will have a new one of Lincoln design. Hypoid gears will be used in the rear end. The engine will have hydraulic valve tappets of Wilcox-Rich manufacture. The front end of the car has been redesigned to give somewhat the same effect as the Cord. The gear-shift lever has been taken out of the center of the front compartment floor and put up by the instrument board. Incidentally, Studebaker and Graham are among the companies which have swept the front compartment clear of the gear-shift lever.

Graham Design

The new Graham is said to be a honey. It was designed by the late Amos Northrup, who also designed the present Willys. The front-end treatment is said to resemble somewhat the Willys on a much bigger scale.

Briggs Mfg. Co. is reported to have one of the most ambitious expansion programs in the motor industry. Having failed to acquire Motor Products, it is preparing to erect a sizable plant on Mound Road next to the proposed Dodge Truck plant which will be used to fabricate metal molded parts for automobiles. Then it is proposing to move some operations to a small plant bought from Hudson recently. Briggs is said to be on the verge of going into motor parts manufacture on a large scale. It has developed a new cylinder head which may be included among its products.

The fact is clearly discernible that Briggs is working toward a closer alignment with Chrysler. There has been considerable loose talk about



Four-of-a-Kind—Oil holes are drilled in four Plymouth connecting rods at one time. Cam-feed drills are tripped by foot pedal, return automatically

Briggs becoming the Fisher Body of Chrysler, but any absorption of Briggs by Chrysler is scouted by informed observers. Briggs apparently has the desire to continue to carry water on both shoulders by building bodies for both Chrysler and Ford automobiles.

The idea that any of the Big Three will directly invade the field now occupied exclusively by Willys has been dismissed for '38. All three have their eyes on that field and have watched Willys' success with much interest. They are deterred from entering that market partly because they know that the minute one goes in, the other two will follow. 1939 may tell a different story.

Plastics will make notable gains in the automotive industry the coming year. A recent development is a plastic board on which an adhesive is applied. Wool flock is then sprayed on to give the appearance of an upholstered fabric. The process is now used to make sun visors. An experimental door panel is being developed of this material.

Die-Casting Popular

Die cast radiator grilles are sweeping back into favor for '38. Die cast instrument panels also will be seen the coming year, and in one case headlamp rims will be die cast and chrome plated. Die cast side hood louvres have been specified by one company. Chrysler is said to be going in for die castings in a major manner.

Stainless steel will be used for more parts, but the number of pounds per car won't increase because car makers are cutting down the gage sizes wherever possible to save money. In connection with car finishes Ford is committed more than ever to synthetic enamels. Studebaker is now installing an enamel line for its six and Nash is understood to have decided upon synthetic enamel for its '38 lines. A Chrysler division is known to be considering seat cushions made of piano spring wire in the form of loops impregnated and covered with latex, the design being such as to give the effect of setting in a hammock.

Hupmobile, Studebaker (on the 21st) and Packard are announcing their new cars this month. Most car makers, however, are holding off until October. Studebaker is to have three lines of cars, two sixes and an eight, each being offered in four body styles. Ford is about to purchase some equipment to expand machining facilities for its "52" (60-hp.) job.

HERMAN DIEDERICHS

Herman Diederichs, Cornell Dean of Engineering, Dies

Professor Herman Diederichs, Dean of Engineering, Cornell University, died August 31 at the age of 63. He became Dean of the college last year, succeeding Dexter S. Kimball.

Professor Diedrichs was born in Germany and came to the United States in 1888, receiving an M.E. degree from Cornell University in 1897. A year later he was an instructor for mechanical engineering and became a full professor in 1907.

Since 1921 he had been director of the Sibley School of Mechanical Engineering. He was the first recipient of the John E. Sweet professorship in mechanical engineering at Cornell when it was established in 1928. He was a member of the American Society of Mechanical Engineers and received the Melville award in 1931. He was also a member of the Society of Automotive Engineers and of the Society of German Engineers.

Falk Corporation Makes P.C. Day Vice-President

P. C. Day has been made a vice-president of the Falk Corp., Milwaukee, manufacturer of speed reducers, couplings, gears, castings, and other items.

After being in charge of the West Drayton Gear Works, Power Plant Co., England, for some years, Mr. Day came to the Falk Corp. in 1910 to direct work in helical and herring-bone gearing.

Mr. Day will remain in charge of engineering with the title Vice-President, Chief Engineer.

Price of Tungsten Moves Sharply Upward

Nominal quoted prices for tungsten have risen from $15.75 per unit at the first of January to $30 per unit for domestic tungsten and $34 per unit for Chinese tungsten. A unit of tungsten is a trading term and consists of one per cent of a short ton. No price on ferro-tungsten is being quoted after last week's sharp rise to $2 per lb. Makers of high-speed steels are suffering the effects of the high prices and a continuation of them may cause some substitution of other materials, formerly considered high-priced, for tungsten.

It is believed that the present high price is due in part to speculation based on the Chinese and Japanese conflict. China produces one-third to one-half of the world's supply. A monopoly is exercised on this metal and virtually all shipments are made through Shanghai.

The all-time high for world production of tungsten ore was 32,000 tons in 1918. In 1935 production reached 21,000 tons, and tentative figures indicate that a higher production was reached in 1936. Possibilities are that no real shortage exists, but that circumstances have caused the Chinese monopoly to make only light offerings in the face of very heavy requirements from the steel industry.

While the recent price raise was large, prices have gradually been rising from a 1932 low of $9.50 per unit, to January's price of $15.75 per unit and by June of this year had reached $21 per unit. For this reason the supposition that the present jump in price is due largely to speculation bears some weight.

Acetylene Group to Meet

The International Acetylene Association will hold its 38th annual convention in Birmingham, Ala., November 10–12. Headquarters for the convention will be the Hotel Tutwiler. Technical sessions will be held each afternoon and special sessions are being planned for the evening. The oxy-acetylene process for welding and cutting metals will be features at all these sessions. As a result of a year of development, a series of interesting subjects will be discussed by speakers who are key men in their fields. The attendance at this year's meeting is expected to exceed the 3,100 of last year's convention in St. Louis.

WATCHING WASHINGTON

Many issues hang over for next session of Congress . . . Wage-hour bill sure to come up again . . . N. A. M. supplies facts on surplus tax law . . . "Voluntary" unemployment count approved

WASHINGTON—With chances for a special session growing dim, it looks as though Congress would wait until January to fight again old battles postponed by its adjournment and to start a few new ones. But neither New Dealers nor conservatives are likely to lose much time in the interim. Both proponents and opponents of Administration measures will seek to consolidate their forces and gain public support for the legislative show-down ahead.

One of three things can happen in the next Congress to the Black-Connery wage-hour bill which was halted in the House rules committee by Southern industry while Congress rushed for the merits from Washington's blazing summer. The bill might be passed approximately as it stands with apparent conflict between its regional differential provisions and the Green amendments; or, it can be worked over by either the rules committee or the labor committee and by the House in debate till few or none of its original features remain; or, the bill in any form may be defeated by industry while organized labor faint-praises it from the side lines.

Passage "As-Is" Unlikely

The first possibility, passage as it stands, is remote. Opposition which bottled the bill in the rules committee was not a few willful men but a powerful bloc of Southern industries. The opposition played its hand well and with a degree of luck. In the House rules committee, a bottle neck, where House legislation is often easily throttled, the opponents found nine of the fourteen committeemen, four Republicans and five Southern Democrats, ready to help check the bill.

Three changes are most obvious: (1) Modify the Green amendments which provided that the board could take wage and hour conditions set up by collective bargaining in any place and impose them upon employees in any other place within the 40-hour, 40-cent limits set up by law; (2) Make the regional differential provision directly applicable to the South; as it stands the text is rather vague; (3) Lower the 40-cent floor and raise the 40-hour ceiling.

For the third possibility, ultimate defeat of the proposal, there is some fairly credible argument. The Administration's sun is lower in the sky, and its rays will not be so hot as they were. The bill, having once been beaten, will be under defeated-candidate handicap. Increasing prosperity will further cool the ardor of the crusade for the common man; the voting public will lack interest. Organized labor will continue to pose as a friend of the bill but will not fight for it unless some deal is made with the Administration.

But ultimate defeat for some form of wage-hour bill is highly improbable. Uplift for the lowly, including those who don't deserve it, is the fashion and will be for some time. In fact, so possible is passage of a labor standards measure, even a drastic one, that some Congressmen and many observers believe the opposition made a mistake in throttling the Black-Connery bill.

Intended to assist in obtaining modifications of the undistributed profit tax, the National Association of Manufacturers has filed with the Treasury Department an extensive survey of the effects of the law based on letters from manufacturers in all parts of the country. The hope is that amendments to the existing law will be submitted to Congress at the coming session and that the tax adopted last year which imposes a heavy penalty on net income not distributed as dividends will be materially lightened.

Among the ten conclusions given in the survey are the familiar objections against this piece of legislation. They are based largely on the tendency of the law to promote industrial instability by discouraging adequate reserves and to handicap young, growing concerns or others having a large indebtedness as against strong companies already in an advantageous position. Of particular importance to many capital goods concerns is the handicap that this law places on industries operating on a cycle of profitable and losing years which must replenish in the fat years surpluses depleted during the lean ones.

Rumblings of another issue, as yet under cover, but which is likely to become active in 1938, is the Roosevelt-for-a-third-term idea. Opponents of New Deal social doctrines are becoming jittery over the continuous inoculation of the voters with this thought. The first steps in the fight will come in the next session of Congress in which the line-up of conservatives versus the New Deal will be clear on taxes, government regulation, and on nearly every issue except public utilities. Not even the most optimistic conservatives think Roosevelt has slipped enough in popular estimation for them to defeat him for renomination. The only hope is an indignant public reaction against breaking the third-term tradition. This, they fear, is being made less and less likely by bi-weekly statements of one sort or another.

Bitter-Sweet

Failure of President Roosevelt to veto the sugar bill is the most significant straw in the wind since his defeat on the Supreme Court bill. Utterly irrespective of its merits, this sugar action was a tremendous victory over the President by the group in Congress actually led by Senator Pat Harrison of Mississippi. Harrison just happens to be the man defeated by one vote for majority Senate leader to fill the place of Joe Robinson. Everyone, including Pat, knows that the President beat him.

Harrison is chairman of the Finance Committee, which handles all tax and tariff legislation, sure to be important in the next session. He and his friends, with a little logrolling, were not only able to beat the President on sugar, but their victory was so overwheming that Speaker Jack Garner decided to head off a test. He kept the bill in his desk until it was too late for the President to veto it and get it back. Thus saving what Garner, admittedly a shrewd judge, figured would be a certain passage of the bill over the President's veto!

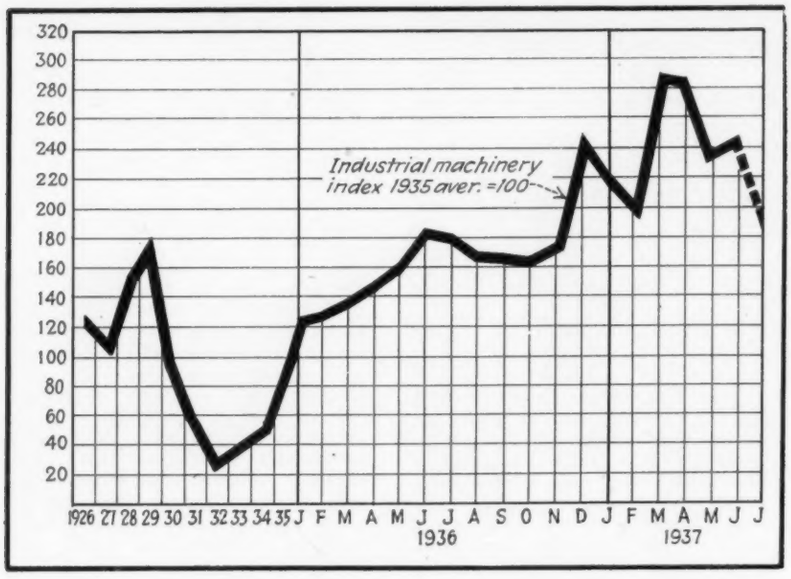
Roosevelt is counting on a popular uprising against the conservatives to turn the tide—get the current running as it was up until last January. No one can be sure, but the odds ought to be about three to two the voters won't be much excited by the fireside talks in prospect.—CARTER FIELD, *Washington Bureau, McGraw-Hill Publishing Co.*

Census Won't Embarrass

Administration forces, while unable to stop the bill adopted by Congress, were able to prevent the passage of a real census bill. In signing the measure on August 30, President Roosevelt provided for registration of the unemployed on the understanding that there would be no compulsion or house-to-house canvass. The unemployed do not register unless they so desire. Under the bill the President may prescribe methods and regulations at his will except that the census must be finished by April 1, 1938.

The ostensible objection voiced by the President and his chief relief aids to a comprehensive census is that it is impossible to set up a definition of "unemployed". They contend that employment shifts so much and is so subject to family and other circumstances that the value of such a census is nil.

Critics of this attitude state that the Administration does not want to know the facts or at least have the public know them. They say that a real count of the unemployed would furnish a severe indictment of the conduct of relief agencies and prove that the millions being expended in this direction cannot be justified.



Industrial Machinery Index Drops Sharply

Based on the industrial machinery orders so far received the preliminary estimate of the Industrial Machinery Index for July stands at 202. This is a drop of nearly 50 points from the June figure and reflects both seasonal factors and the effects of uncertainty created by labor troubles. Even so the July level was exceeded by only one month of 1936.

A.S.M.E. to Hold Fall Meeting

In addition to the regular annual and semi-annual meetings of the American Society of Mechanical Engineers, the council of the Society has extended its activities to include a Fall and a Spring meeting. The first Fall meeting is scheduled for October 4–6 at Erie, Pa. Ten professional divisions of the Society are cooperating with the Erie local section in providing papers for this meeting. The program for the meeting is as follows:

Monday, October 4
10:00 A.M.

Power Session

"New Metal for High-Temperature Service," Roger S. Brown and C. L. Clark.

"Rehabilitation of Station No. 3, Rochester Gas & Electric Corp.," by R. H. Boas.

Railroad Session

"Flexible Mounting of Diesel Engines for Transportation Service," H. W. Gouldthorpe.

"Place of Railroads in Modern Transportation," J. V. B. Duer.

Machine Shop Practice Session

"Better Electrical Apparatus with Minimum Welding," A. P. Wood.

"Machine Shop Practice Pertaining to Arc Welding and Steel Fabrication," A. C. Cochrane.

Oil and Gas Power—Hydraulic Session

"Investigation of a Simple Form of Hydraulic Dynomometer," E. P. Culver.

Tuesday, October 5
10:00 A.M.

Fuels Session

"Use of Individual Gas Producers for Supplying Processed Fuel" by Allen J. Johnson.

"Burning of Waste Liquors in the Kraft and Soda Paper Industry," Leslie S. Wilcoxson.

Management Session

"Production Planning and Control," with papers W. A. Barr, E. L. Sheehy and E. W. Johnston.

Process Session

"Steam, Power and Water—Distribution and Use in Manufacture of Sulphite Paper," R. E. Sternberg.

"Fundamental Requirements in Residential and Small Commercial-Office Air Conditioning," George B. Helmrich.

Railroad—Machine Tools Session

"The Electric Gage," E. S. Lee and C. M. Hathaway.

"Experience with the Dynamic Effect of Locomotives and Cars on Railroad Tracks," F. M. Graham.

Wednesday, October 6
10:00 A.M.

Management Session

"Production Planning & Control," by Thomas M. Landy.

"Present-Day Trends in Wage Incentives," by Merritt Lum.

Instrument Session

"Industrial Instruments — Their Theory and Application," Ed S. Smith, Jr. and C. Owen Fairchild.

"A Theoretical Approach to the Application of Temperature Controllers," Edmund D. Haigler.

"Pressure Responsive Elements," by Paul Exline.

"Metering of Oil with Positive Displacement and Current Type Meters," E. M. Cloran.

Cutting of Metals Session

"Determing the Tool-life Cutting-Speed Relationship by Facing Cuts," Charles Kraus and R. R. Wedell.

"Power and Forces in Milling S.A.E. 3150 Steel With Helical Mills," O. W. Boston, W. W. Gilbert and K. B. Kaiser.

In addition to these special technical sessions, plant inspections are planned for every afternoon. A general session will be held at the first luncheon meeting on Monday, at which the speakers will be President James H. Herron and H. L. R. Emmet. A general session on Monday evening will include a paper "The Young Mechanical Engineer in the Electrical Manufacturing Industry," by A. R. Stevenson, Jr. and E. E. Parker.

Simplified System Proposed For Various Types of Bolts

A proposed simplified practice recommendation covering stock nominal sizes of machine, carriage and lag bolts has been mailed to manufacturers, distributors, and users by the Division of Simplified Practice, National Bureau of Standards, for consideration and acceptance.

The original recommendation was made by the American Institute of Bolt, Nut and Rivet Manufacturers, and lists marginal items leaning towards stock, as well as stock items.

PERSONALS

W. A. NEILL is now manager of engineering and sales activities at the recently opened plant of the Worthington Pump & Machinery Corp. at Holyoke, Mass. Mr. Neill was formerly manager of the corporation's air tool and portable compressor division at Harrison, N. J.

PAUL L. HILEMAN is now general manager, Jadson Motor Products Co., Bell, Calif. Mr. Hileman has been Detroit representative for Thompson Products, Inc., for the past nine years.

M. W. LADE has been appointed a vice-president and treasurer of Globe-Union, Inc., manufacturer of storage battery, radio parts, spark plugs and roller skates, Milwaukee. W. BALLINGER FYFFE, formerly treasurer, became secretary.

RUSSELL SCHULTZ is the new assistant master mechanic in Chevrolet's Buffalo plant. He is a son of OTTO SCHULTZ, master mechanic of the gear and axle plant in Detroit.

J. L. AUER has recently accepted the position of assistant works manager, R. Hoe & Co., Inc., New York, manufacturers of newspaper and magazine printing presses. He was formerly works manager of DeLaVergne Machine Co., New York, the I. P. Morris Co., Philadelphia, and later superintendent of the Crocker Wheeler Electric Mfg. Co., Ampere, N. J.

S. F. WOLLMAR, formerly of the SKF Hofors Mill in Sweden, has been elected president, SKF Steels, Inc., 369 Lexington Ave., New York. N. S. PETERSON is vice-president.

KERMIT DONALDSON, assistant sales manager, Machine Steel Castings Co., Alliance, Ohio, succeeds L. C. HETZEL, resigned, as plant superintendent.

S. DAVEY, superintendent, tin plate division, Republic Steel Corp., has resigned to become vice-president in charge of operations, Canton Metals Decorating Co., Canton.

WAYNE Z. FRIEND has joined the development and research staff of the International Nickel Co., Inc., New York.

FREDERICK B. HEITKAMP has been elected vice-president of American Type Founders Sales Corp. Mr. Heitkamp was formerly vice-president of Lyon Metal Products, Inc., and for many years general sales manager, Cincinnati Milling Machine and Cincinnati Grinders, Inc.

MRS. FRIDA F. SELBERT, secretary, National Machine Tool Builders' Association, returned to this country on the S. S. Manhattan, Thursday, September 2, after several weeks abroad.

CHARLES C. TOMNEY, former tool designer, Carrier Corp., is now sales engineer, Vandyck Churchill Co., machine tool dealers, 114 Liberty St., New York.

L. M. HART has been elected president, the White Co., Ltd., to succeed ROBERT F. BLACK who continues as chairman of the board, and is also president of the White Motor Co. of Cleveland, Ohio. Mr. Hart has been vice-president and managing director of the White organization in Canada for several years.

J. A. FIX, formerly plant manager, South Bend Division, Oliver Farm Equipment Co., is now general plant manager of all Oliver branches. He is succeeded at South Bend by S. F. Krzeszewski.

RAYMOND A. DEVLIEG, formerly with Kelvinator Corp., Detroit, has been made general works manager, Nash Motors Division, Nash-Kelvinator Corp. He will be in charge of Nash factories in Kenosha and Racine, Wis., and Seaman Body Corp., Milwaukee.

CHAUNCEY WILLIAMS has been promoted to general factory superintendent, Four-Wheel Drive Auto Co., Clintonville, Wis., succeeding the late CURRAN C. MCCONVILLE.

BUSINESS ITEMS

Wm. Sellers & Co., Inc., announce the appointment of WALTER P. LOTZ as sales manager, Standard Tool Division, to supplement the activities of EDWARD L. HOLLJES, sales manager. Mr. Lotz will be in charge of agency distribution activities on the standard line of grinders, planers and horizontals in order that Mr. Holljes may be able to devote more of his time to the large industrial tools and railroad equipment.

Blaw-Knox Company has purchased the assets and business of R. M. Gordon & Co., manufacturer of grease lubricating system for the steel industry. The company will be known as the Gordon Lubricator Division of the Blaw-Knox Company.

Reed-Prentice Corp., manufacturer of machine tools, Worcester, Mass., celebrate their sixty-fifth anniversary this year. The company began with the manufacture of lathes and drilling machines under the name of A. S. Prentice & Company in 1872.

Ideal Commutator Dresser Co., manufacturers of electrical equipment, Sycamore, Ill., is making plant alterations which will approximately double their present floor space.

Mercer Tube & Mfg. Co., Sharon, Pa., reorganization was completed with the reelection of HENRY GREENBERG as president. C. V. SAWHILL is treasurer and general manager; SAMUEL GOLDBERG, secretary, and O. L. LONG, comptroller.

Detroit Macoid Corp.. producer of molded plastic products and celluloise coated metal parts principally for automobiles, Detroit, has leased the branch plant of Yale & Towne Mfg. Co., at 12340 Cloverdale Ave.

Globe-Union Mfg. Co., maker of storage batteries, spark plugs, roller skates, etc., Milwaukee, has purchased the former Milwaukee Air Power Pump Co., and Combustion Oil Burner Co. plant from Heil Co., Milwaukee.

Mount Clemens Metal Products Co., Inc., Mount Clemens, Mich. has been organized to manufacture metal fastening devices for automotive manufacture. ALBERT GLASS will be plant superintendent.

Buffalo Foundry & Machine Co., Buffalo, has named W. C. GROVE, manager of the Chicago branch. He was formerly manager of the Toronto office.

American Screw Products Co., Newark, N. J., manufacturer of screw machinery products, has moved to larger quarters at 38-42 Littleton Ave.

Fedders Mfg. Co., manufacturer of automobile radiators, electric refrigeration equipment, parts, etc., 57 Tonawanda St., Buffalo, is planning a 10,000 sq. ft. addition to its floor space, primarily for a tube-bending shop.

Lindberg Engineering Co., manufacturer of mechanical equipment and temperature controls, 219 N. Union Park Court, Chicago, is adding a one-story unit for an assembling shop costing almost $40,000 with equipment.

Fire at the Duncan Foundry & Machine Works, Alton, Ill., destroyed most of the mold shop with an estimated loss in equipment and machinery of $150,000.

Hammond Machinery Builders, Kalamazoo, Mich., has appointed the B & H Sales Co., 4980 Potomac St., St. Louis, Mo., as its representative in that city. The company also announced the appointment of C. B. HOLLINS, 2132 Morse Ave., and C. P. Guion, 1661 Milwaukee Ave., Chicago, Ill., as its representatives in Wisconsin, Illinois, Iowa and Indiana in the sale of grinders for foundry use.

Foote Bros. Gear & Machine Co., Chicago, has named EUGENE D. WILSON, 701 Columbian Mutual Tower, Memphis, Tenn., as district representative in that territory. ,

The C. F. Pease Co., Chicago, Ill., manufacturers of blue-printing machinery and other drafting room materials, are moving their fatory to 2601 West Irving Park Road.

Acme Spinning Mfg Co., metal spinners, 1235 S. Lorena St., Los Angeles, has been organized by HENRY L. ROUTH.

Chicago Pneumatic Tool Co. has moved its Buffalo, N. Y., sales and service office to 128 West Chippewa Street.

Cutler-Hammer, Inc., have opened a new office in New Orleans, La., at 539 Gravier Street. JOSEPH GARDBERG is manager.

The Lincoln Electric Co., Cleveland, has opened a new Sales Engineering office at 400 North Street, Bluefield, W. Va. WM. H. SCHUSTER will be in charge.

Mathews Conveyer Company, Ellwood, City, Pa., has appointed C. E. JEREMIAS and E. A. SMITH to their new Detroit office at 2842 West Grand Blvd.

Back Issues Available

Anyone desiring copies of *American Machinist* for the years 1900–1904 may secure them from M. A. Kramer, 409 East High St., Portland, Ind.

OBITUARIES

Wilbert L. Smith, Pioneer in Typewriter Industry, Dies

Wilbert Lewis Smith, pioneer in the typewriter business and president of the board, L. C. Smith & Corona Typewriters, Inc., died August 28 at the age of 85.

Mr. Smith entered business in 1885 as an associate of his elder brother, Lyman C., at that time engaged in the manufacture of guns. Later the gun business was sold and the four Smith brothers engaged in the manufacture of the Premier typewriter. He later helped form and became president of the L. C. Smith & Bros. Typewriter Co. In 1924 he became chairman of the board. He was also a director of the Crucible Steel Co. of America.

PHILIP BRUNK, founder of the Brunk Machine & Forging Co., Lorain, O., died August 22. He was 78 years of age.

SAMUEL BRECK, for the past seven years superintendent of production, Millers Falls Tool Co., died at Middleboro, Mass., on August 21, at the age of 47.

WM. A. MILLER, JR., sales manager, William A. Miller Machine & Eelevator Co., died of heart disease August 26. He was 46 years of age. Mr. Miller joined the firm, which is owned by his father, 22 years ago.

GEORGE W. CAMPBELL, works manager, Underwood-Elliott-Fisher Co., Hartford, Conn., died August 30. Mr. Campbell had been works manager of the Bridgeport plant and later the Hartford plant for more than 20 years.

GEORGE R. MURPHY, president, Reliance Motor & Machine Works, Ltd., Vancouver, B. C., died recently. He was 50 years old.

MEETINGS

AMERICAN GAS ASSOCIATION. Ninteenth annual convention. Cleveland, Ohio. September 27-October 1. ALEXANDER FORWARD, managing director, 420 Lexington Ave., New York.

AMERICAN FOUNDRYMEN'S ASSOCIATION. Midyear meeting. Columbus, Ohio. Sept. 30-Oct. 1.

AMERICAN GEAR MANUFACTURERS ASSOCIATION. Twentieth semi-annual meeting. Spink-Wawasee Hotel, Lake Wawasee, Indiana. Sept. 20-22. J. C. MCQUISTON, secretary, Penn Lincoln Hotel, Wilkensburg, Pa.

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS. Iron and Steel Division. Atlantic City, N. J., Oct. 18–22.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS. First Fall meeting. Hotel Laurence, Erie, Pa. Oct. 4-6.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Welding Committee and Machine Shop Practice Division. Atlantic City, N. J., Oct. 18–22.

AMERICAN SOCIETY FOR METALS. National Metal Congress and Exposition. Atlantic City, N. J., Oct. 18–22. W. H. EISENMAN, secretary, 7016 Euclid Ave., Cleveland.

AMERICAN WELDING SOCIETY. Annual meeting, Hotel Traymore, Atlantic City, N. J., Oct. 18–22. WARREN S. HAYS, managing director, 39 W. 39th St., New York.

ASSOCIATION OF IRON & STEEL ENGINEERS. Annual meeting combined with Iron & Steel Exposition, Stevens Hotel, Chicago. Sept. 28–Oct. 1.

CHICAGO EXPOSITION OF POWER AND MECHANICAL ENGINEERING. New International Amphitheatre, Chicago. October 4–9. CHARLES F. ROTH. vice-president, International Exposition Co., Grand Central Palace, New York.

MASTER BOILER MAKERS ASSOCIATION. Annual meeting, Hotel Sherman, Chicago. Sept. 29–30. A. F. STIGELMEIER, secretary, 29 Parkwood St., Albany, N. Y.

NATIONAL AUTOMOBILE SHOW. New York. Oct. 27-November 3.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION Annual meeting. Chicago. Oct. 24–29. W. J. DONALD, managing director, 155 E. 44th St., New York.

NATIONAL MACHINE TOOL BUILDERS ASSOCIATION. Annual Convention. Hot Springs, Va., Oct. 25–27.

NATIONAL METAL SHOW. Convention Hall, Atlantic City, N. J., October 18-22.

NATIONAL SAFETY COUNCIL. Annual meeting. Kansas City, Mo. Oct. 11–15. W. H. CAMERON, secretary, 20 N. Wacker Drive, Chicago.

PORCELAIN ENAMEL INSTITUTE. Seventh annual meeting, Chicago, Ill. October 11–12.

PORCELAIN ENAMEL INSTITUTE. Second forum. Ohio State University. Columbus, Ohio. October 13–15.

SOCIETY OF AUTOMOTIVE ENGINEERS. National aircraft production meeting. Los Angeles, Cal., Oct. 7–9.

SOCIETY OF AUTOMOTIVE ENGINEERS. Fuels and Lubricants Meeting. Tulsa, Okla., Sept. 30-Oct. 1.

PATENTS

August 17, 1937

Metal-Working Machinery

Broaching Lathe. William F. Groene and Walter R. Meyer, Cincinnati, assignors to The R. K. Le Blond Machine Tool Co., Patent 2,090,119.

Machine for Cleaning and Degreasing Metal Articles. Georg Edhofer, Munich, Germany, assignor to Dr. Alexander Wacker Gesellschaft fur Eicktrochemische Industrie, G.m.b.H., Munich. Patent 2,090,191.

Means for Degreasing and Cleaning Metal Articles. Georg Edhofer and Georg Wolff, Munich, Germany, assignors to Dr. Alexander Wacker Gesellschaft fur Elektrochemische Industrie G.m.b.H., Munich Patent 2,090,192.

Machine for Extruding Plastic Material. Frederic A. Parkhurst, Bethesda, Md., assigned to The Fiberloid Corp., Indian Orchard. Patent 2,090,404.

Hydraulic Materials Testing Machine. Richard W. Dinzl, Narberth, Pa., assigned to Baldwin-Southwark Corp. Patent 2,090,475.

Parts and Mechanisms

Charging Device for Metallurgical Furnaces. Levi S. Longenecker, Pittsburgh, Pa. Patent 2,090,056.

Automatic Control Means for Machine Tools. Donald H. Montgomery, Hartford, and William B. Retz, Plainville, Conn., assigned to The New Britain Machine Co., New Britain. Patent 2,090,262.

Drill Mechanisms. Oscar B. Jones, Columbus, Ohio, assigned to The Jeffrey Mfg. Co. Patent 2,090,330.

Clap Arrester. William F. Zimmermann, Maplewood, N. J., assigned to Gould & Eberhardt, Newark. Patent 2,090,506.

Shaper Tool Lifter. William F. Zimmermann, Maplewood, N. J., assigned to Gould & Eberhardt, Newark. Patent 2,090,507.

Electric Tool Lifter for Shapers. William F. Zimmermann, Maplewood, N. J., and Granger Davenport, Brooklyn, N. Y., assigned to Gould & Eberhardt, Newark. Patent 2,090,508.

Tools and Accessories

Surface Test Indicator. Eugene J. Witchger, Saginaw, Mich., assigned to The Lufkin Rule Co., Saginaw. Patent 2,090,495.

August 24, 1937

Metal-Working Machinery

Nut Threading Machine. Victor E. Pearson, Buffalo, N. Y., assigned to The Waterbury Farrel Foundry & Machine Co., Waterbury. Patent 2,090,698.

Dynamic Balancing Apparatus. Harry W. Moore, Dayton, Ohio. Patent 2,090,803.

Thread Milling Machine. Walter D. Archea, Cincinnati, assigned to The Cincinnati Milling Machine Co., Cincinnati. Patent 2,090,992.

Internal Milling Machine. Walter Hoier, Cincinnati, assigned to The Cincinnati Milling Machine Co., Cincinnati. Patent 2,091,000.

Friction Testing Apparatus. Lemuel M. Stuart, Brooklyn, N. Y., assigned to Ford Instrument Co., Inc., Long Island City. Patent 2,091,022.

Parts and Mechanisms

Indexing Attachment for Slotting Machines. Amos Tetreault, Newport, R. I. Patent 2,090,649.

Electrode Assembly. Alfons Kauffeldt. Berlin, Germany, assigned to Telefunken Gesellschaft fur Drahtlose Telegraphic m.b.H. Berlin. Patent 2,091,047.

Apparatus for Degreasing Metal and Like Nonabsorbent Articles By Means of Volatile Solvents. Joseph Arthur Musgrave Woodcock Mitchell, Runcorn, England, assigned to Imperial Chemical Industries, Ltd. Patent 2,091,182.

Degreasing Apparatus. Joseph Savage Runcorn, England, assigned to Imperial Chemical Industries, Ltd. Patent 2,091,187.

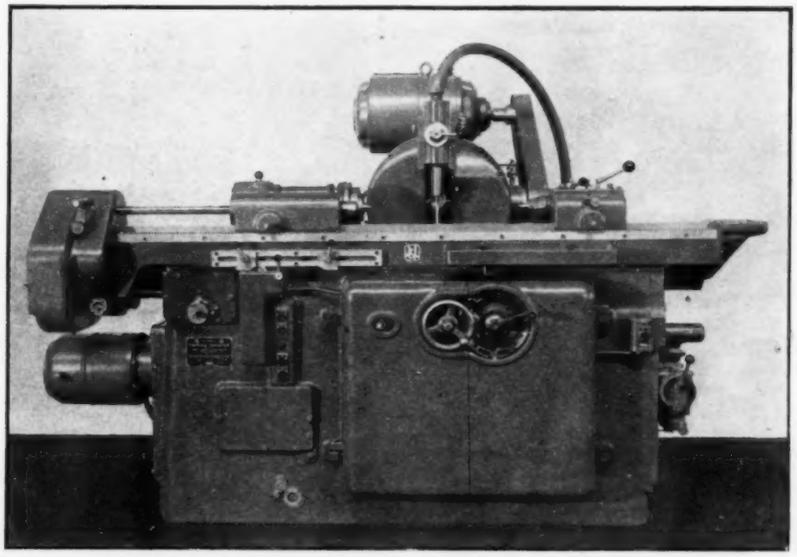
Tools and Accessories

Flaring Tool. William E. Arndt, Detroit, assigned to The Imperial Brass Mfg. Co., Chicago. Patent 2,090,660.

Geared Wrench. Francis A. Reimke, Detroit. Patent 2,090,964.

Metallizing Device. William H. Stevens, San Francisco, assigned to Metalon Products Co., San Francisco. Patent 2,091,021.

SHOP EQUIPMENT NEWS



Work 48 in. long may be held between centers, and 18 in. of thread can be ground anywhere on 36 in. work length

J & L 48-In. Automatic Thread Grinder

Designed to grind threads in hard or soft material on work up to 8 in. in diameter when using a 20-in. grinding wheel, the 48-in. automatic thread grinder announced by Jones & Lamson Machine Co., Springfield, Vt., is similar in design but of larger capacity than the thread grinder previously described (*AM*—Vol. 80, page 634). Work 48 in. long may be held between centers and 18-in. of thread may be ground anywhere on 36-in. work length. Work 11½-in. in diameter may be swung over the work slide and 11½-in. diameter threads may be ground when the wheel is 16½-in. in diameter or smaller. A 20-in. diameter grinding wheel is furnished as standard equipment and, as the wheel decreases in size, the proper peripheral speed may be maintained through rheostat speed-control of the d.c. wheel motor.

Helix-angle capacity of this machine is increased to include 25 deg. right-hand and 30 deg. left-hand. The helix angle is adjusted by means of a worm and gear. Standard equipment includes change gears for pitches from 2 to 48 inclusive. The machine will grind single, double, triple, quadruple and sextuple threads, either right or left hand. Using a simple, hardened and ground former, it will grind taper, combination of straight and taper, or double taper threads. Grinding wheel is always at right angles to the axis of the work. Therefore no adjustment of thread form is required when changing from straight to taper threads and it is claimed that lead compensations are unnecessary.

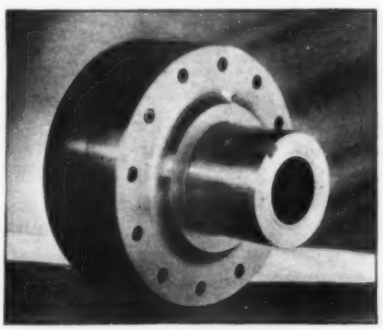
A scale attached to the truing device records the wheel diameter at all times and a graduated rheostat with pointer indicates the spindle r.p.m. A chart on the wheel slide shows the number of surface feet the wheel is running, based on the wheel diameter and spindle revolutions. As the wheel is reduced in diameter, the proper speed is maintained by adjusting the rheostat.

Hilliard Improved Over-Running Clutch

Design of the over-running clutch, manufactured by Hillard Corp., 102 West Fourth St., Elmira, N. Y., has been improved so that each roll is now controlled by individual springs. This is claimed to reduce backlash in the clutch to a negligible point and to insure smooth and instantaneous engagement when the clutch takes up the drive. In the former design rolls were retained in a cage which was controlled by one to three springs, this case controlling all the rolls.

Also, in the earlier design, the hub of the clutch was not alike on both ends. In order to reverse direction of rotation in the field, it was necessary to take the entire mechanism apart and reassemble the cage and rolls to operate in the opposite direction. The hub of the new clutch is symmetrical and to reverse operation in the field it is only necessary to remove the cover, take out the hub on which the roller mechanism is assembled as a unit, and turn it end for end in replacing.

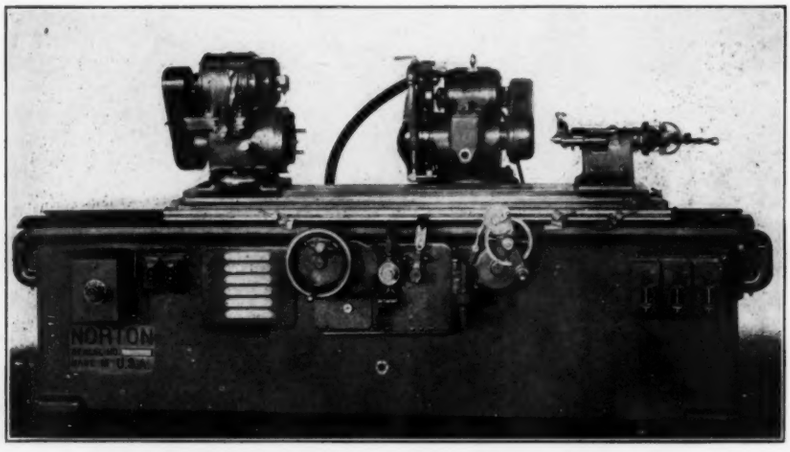
Standard clutches are equipped with sleeves for convenience in mounting pulleys, gears or sprockets. Another feature of the clutch makes it possible to equip any standard clutch with double the number of rolls when unusual conditions call for high torque capacity and space for a clutch is limited. Capacity range is from ⅓ to 340 hp. at 100 r.p.m. Larger units can be built on order.



Dumore No. 12 "Chief" 1-Hp. Lathe Grinder

The 1-hp. capacitor motor used on the No. 12 "Chief" lathe grinder, offered by The Dumore Co., Racine, Wis., is dynamically balanced to eliminate vibration and chatter marks in grinding. Power from the motor is transmitted to the quill by two No. 1 section V-belts, and belt tension is secured by sliding the motor on the base and tightening four capscrews. Six sheaves are furnished so that spindle speeds of 2,800 to 8,200 r.p.m. are available for delivering correct speeds for 8 to 3-in. wheels.

One external and five internal quills are available for this grinder; all are claimed to be capable of grinding to 0.0001 in. accuracy. These quills are designed for horizontal operation. For vertical work of a production nature, a special quill is available. The external quill has a wheel capacity of 3¼ to 8 in. and is built for heavy work. The five internal quills will grind holes 2⅜ in. diameter and larger to a depth of 8-, 12-, 16-, 20- and 24-in. depths. This grinder is suitable for internal and external grinding on lathes and for surface grinding on planers.



Hydraulic work-table traverse speeds up to 144 in. per min. are available in the "Multipurpose" grinder

Norton 14-In. "Multipurpose" Hydraulic Universal Grinder

A completely redesigned model of the "Multipurpose" universal grinder has been announced by Norton Co., Worcester, Mass. This grinder is offered with a 14-in. swing and in 36-, 48- and 72-in. lengths. These machines are claimed to be equally efficient for miscellaneous general production grinding and for toolroom work.

Hydraulic power work-table traverse is provided, and forced-feed lubrication is used for the table ways. Direct motor drive is employed, and the principal mechanisms are driven by individual motors. Five motors are used, three of which are for the hydraulic oil, lubricating oil and coolant pumps which are built into the machine and are included in the regular equipment. The flat-top swivel table has a large T-slot running the entire length. The swivel adjustment at the right end of the table comprises a screw and nut arrangement, providing for close adjustment. Scales are graduated to indicate taper in inches per foot, millimeters per 100 mm. and degree of angle.

Universal headstock is mounted on a swivel base clamped to the table by two bolts in a manner that prevents distortion. The headstock may be turned through the entire 360 deg. and clamped in any desired position. Drive is through V-belts from an adjustable-speed motor mounted on the headstock. Spindle and drive-plate revolve on ball bearings and change over from live-spindle to dead-center operation can be made instantly. Stopping and starting of the headstock is controlled by a convenient lever operating a cone-type clutch and friction brake so that it is not necessary to stop and start the motor. A clear hole through the spindle permits the use of a draw rod for a draw-in collet, a knock-out bar, or a pipe for wet internal grinding, as desired.

Work-table traverse is by handwheel or by hydraulic power. Hydraulic traverse is by means of a cylinder attached to the under side of the table and two pistons, the rods of which are attached one to each end of the base casting. When hydraulic traverse is used, the handwheel is automatically disengaged. Traverse speeds up to 144 in. per min. are available.

The universal grinding wheelhead rests on a swivel base and compound slide. The wheels for either external or internal grinding may be set at any desired angle with the work. External and internal grinding wheel spindles are mounted on opposite sides of the wheel head and are driven independently by a motor mounted on the wheel head and having a double shaft extension. Direct belt drive to each spindle from the motor requires no idlers or intermediate shafts.

Wheel-Feed Control

A hand-operated grinding wheel feed indexes to 0.0001 in. and also provides for rapid movement when locating with respect to the work. Wheel-feed control is conveniently located on the front of the machine and is operated from this position regardless of the setting of the wheel slide. Feed may be in the normal direction, perpendicular to the table ways, or in any angular direction for which the wheel head is set by the operator.

The 48-in. machine shown weighs about 8,000 lb., mounts wheels up to 14x1½ in. for cylindrical grinding or cup-type wheels 12x3 in. for face grinding. This machine will swing work 14 15/16 in. over the table top. A 5-hp. motor is required for the wheel drive and a ½-hp. motor for the work drive.

Steel disks furnished as standard equipment may be had for either glueing on abrasive disks or drilled for mounting steel-back abrasive disks. A disk press can be had for glueing abrasive disks in a satisfactory manner to steel ones.

You Can SHEAR Over 5000 Pieces Per Hour

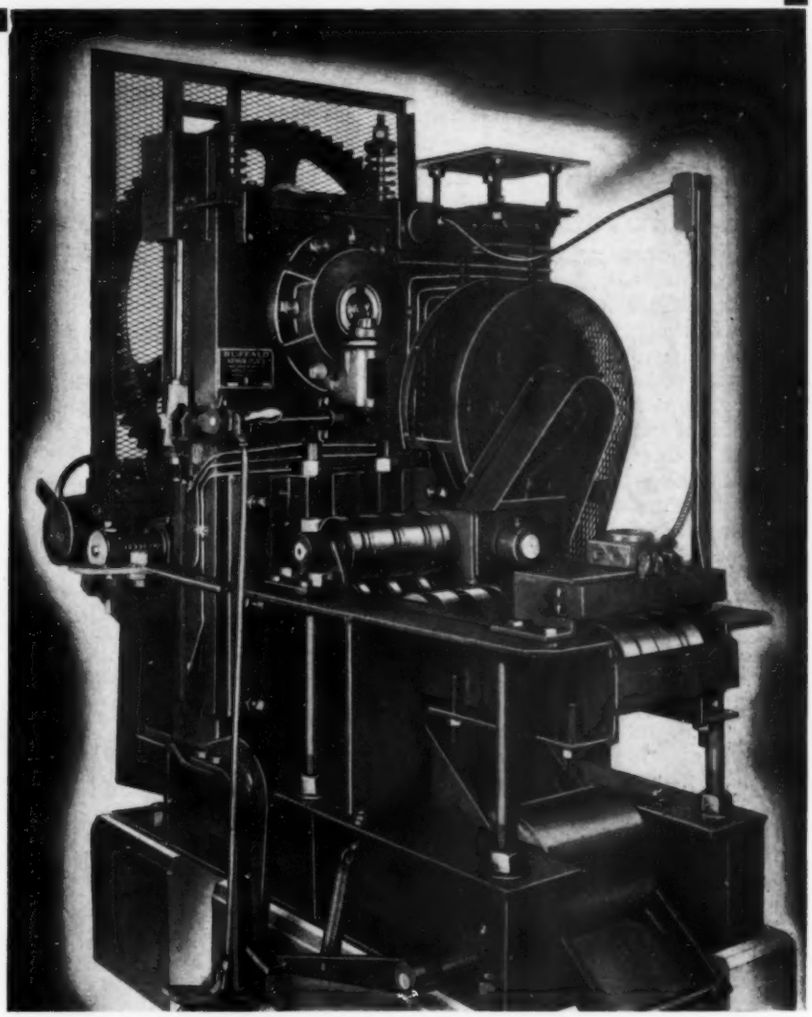
with the

new

"Buffalo"

AUTOMATIC SHEAR

FOR BOLT AND RIVET STOCK



That's real production! But speed alone isn't the only thing you get in this new and better shear—you get accuracy too.

Machine is designed for continuous shearing and is equipped with automatic feed rolls which grip and pull the stock into the shear *only* when knives are open on the "up" stroke. They release their grip the instant the stock touches the rear gauge and the top knife starts to descend. Thus, stock is not scored or marred in any way by slipping rolls under pressure. In addition, machine is equipped with electrical automatic stop device, adjustable in a manner that permits the salvaging of any predetermined length of ends.

Three bars are fed and sheared at one time. Adjustable for any length bolt up to 18" for automatic feed; 48" for hand feeding.

Here is a production machine that will cut costs, improve your product, soon pay for itself.

Write or wire for full details.

BUFFALO FORGE COMPANY

448 Broadway, Buffalo, New York

Branch Engineering Offices in Principal Cities

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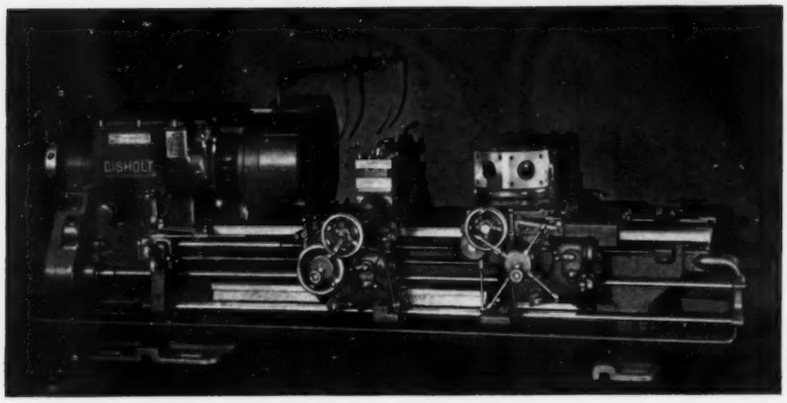


Gisholt No. 3AL, No. 4L and No. 5L Improved Heavy-Duty Turret Lathes

The No. 3AL, No. 4L and No. 5L heavy-duty turret lathes, offered by Gisholt Machine Co., Madison, Wis., have been improved to increase the ease and speed of operation and to improve the quality of work. These three sizes of turret lathes range from 6 to 12-in. bar capacity and 21 to 32-in. chucking capacity.

Bed and headstock of these machines is cast in one piece from nickel semi-steel. Bed ways are of steel, hardened and ground in place. The improved 12-speed transmission is of sliding-gear construction and has a normal speed range of 12 to 220 r.p.m. for the No. 3AL lathe and from 8 to 142 r.p.m. on the No. 4L and No. 5L machines. Speeds are arranged in geometric progression. Spindle is mounted on twin tapered roller bearings at the front and a straight roller bearing at the rear. An automatic multiple-disk spindle brake operates when the clutch lever is placed in neutral position.

Feeds and rapid traverse are controlled at each carriage, independently of each other. Eight reversible feeds are selected at the aprons and range in arithmetical progression from 0.008 to 0.250 in. Change gears permit this range to be varied from a fine range of 0.004 to 0.125 in. to a coarse range of 0.016 to 0.500 in., providing a total of 64 available feeds. Feeding is accomplished through separate lead screws for each carriage. All U. S. standard threads from 2 to 32, including 11½ threads per in. can be cut.

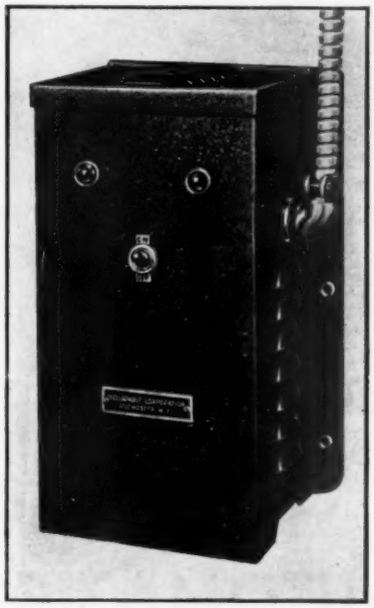
Rapid traverse is independent for each carriage and may be used without disengaging the feed. An electrically operated power rapid traverse may be supplied for the cross slide or the compound slide. Multiple V-belt motor drive is standard, with the motor mounted on the headstock. Depending upon the required speed of operation and the type of work, the No. 3AL machine requires a 15 to 25 hp. motor and the No. 4L and No. 5L require from 25 to 40 hp.

Jarvis "Vario-Flex" Flexible-Shaft Grinder

The "Vario-Flex" flexible-shaft grinder, offered in three sizes by The Charles L. Jarvis Co., Middletown, Conn., features from twelve to fourteen instant speed changes without stopping the machine. Drive is from a 1-, 1½-, or 2-hp. totally inclosed, ball-bearing motor which is mounted on a heavy cast-iron base equipped with rubber-tired wheels. The motor unit is mounted on a swivel which permits operations at any angle on the horizontal plane. The heavy-duty handpiece is equipped with two double-row ball bearings. Shaft speeds range from 2,200 to 4,700 r.p.m. for the 1-hp. Type VF-1 Model and from 2,000 to 4,500 r.p.m. for the 1½- and 2-hp. Type VF-15 and Type VF-2 models. The two smaller models have a ¾-in. spindle, while the Type VF-2 unit has a 1-in. spindle.

Mellaphone Rectifier for Magnetic Chucks

An electronic rectifier, using a mercury-vapor tube, has been announced by Mellaphone Corp., Rochester, N. Y. There are no moving parts and the unit is not affected by dust, grit or moisture. A standard full-wave circuit is used. This unit is designed primarily for supplying d.c. current to magnetic chucks, but can be used



for other applications within its capacity. The model shown is arranged for wall mounting and operates on 110 volts a.c. with a capacity of 220 watts output. Other models can be supplied to work from either 110 or 220 volts a.c. and deliver 110 or 220 volts d.c. to the magnetic chuck.

Williams "Hex-Box" Wrenches

Designed with heads of approximately the same height as the nuts with which they are to be used, "Hex-Box" wrenches announced by J. H. Williams & Co., 75 Spring St., New York, N. Y., have comparatively thin head-walls which are efficient in close quarters. Openings range from 1¼ to 3⅛ in. These wrenches are drop-forged in two lines; carbon-steel wrenches and chrome-molybdenum "Superrenches."

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. . . and
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- Spindle speeds—32 to 298 R.P.M.
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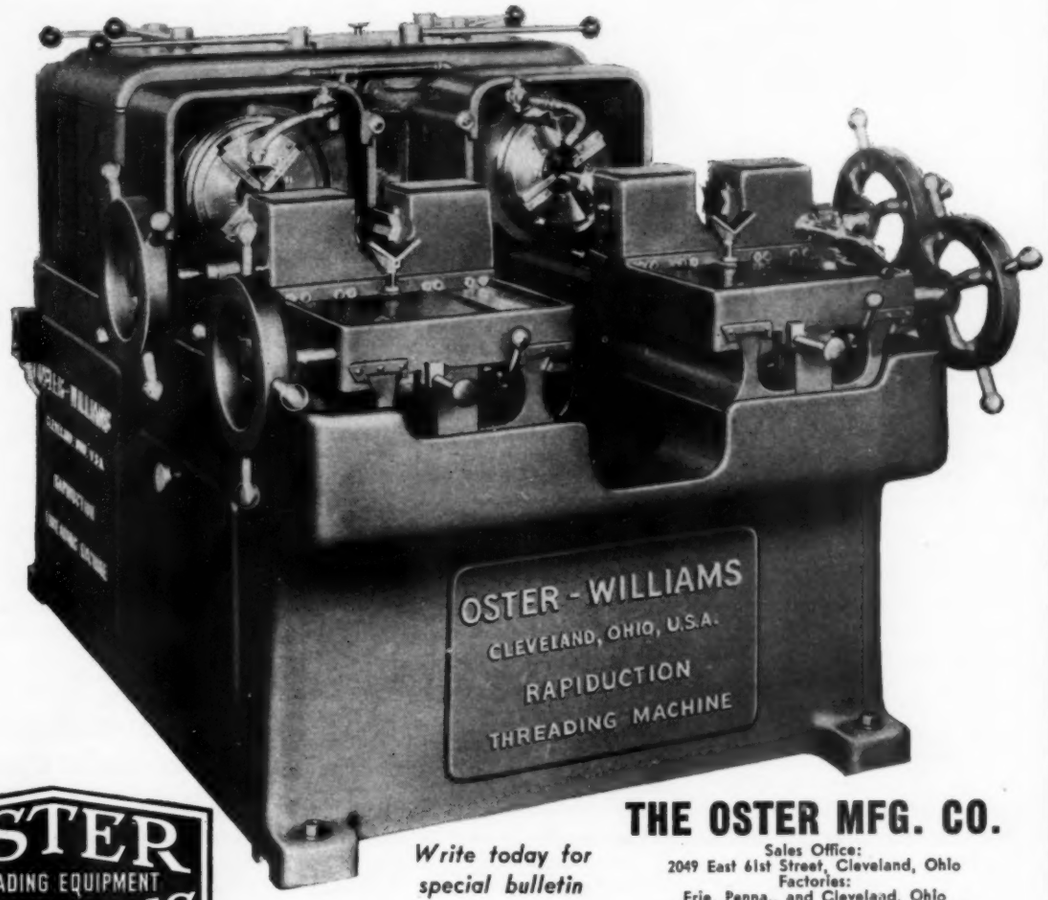
- Entire range of pitches is obtained by changing only one gear.
- Vise and carriage free from obstructions, permitting easy application of fixtures for holding special jobs.
- High accessibility . . . all controls conveniently placed.

Because this RAPIDUCTION Bolt Threader was designed to modern standards from the ground up, with no limitations except to prove the outstanding performer in its field, it embodies every up-to-the-minute feature demanded by today's machine tool experts.

If you are in the market for . . . or even considering the purchase of . . . a machine of this type, it is simply a wise precaution to get the facts about the RAPIDUCTION "900 Series"—single and double spindle machines in two capacities, 3/8" to 1 1/2" and 1/2" to 2 1/4".



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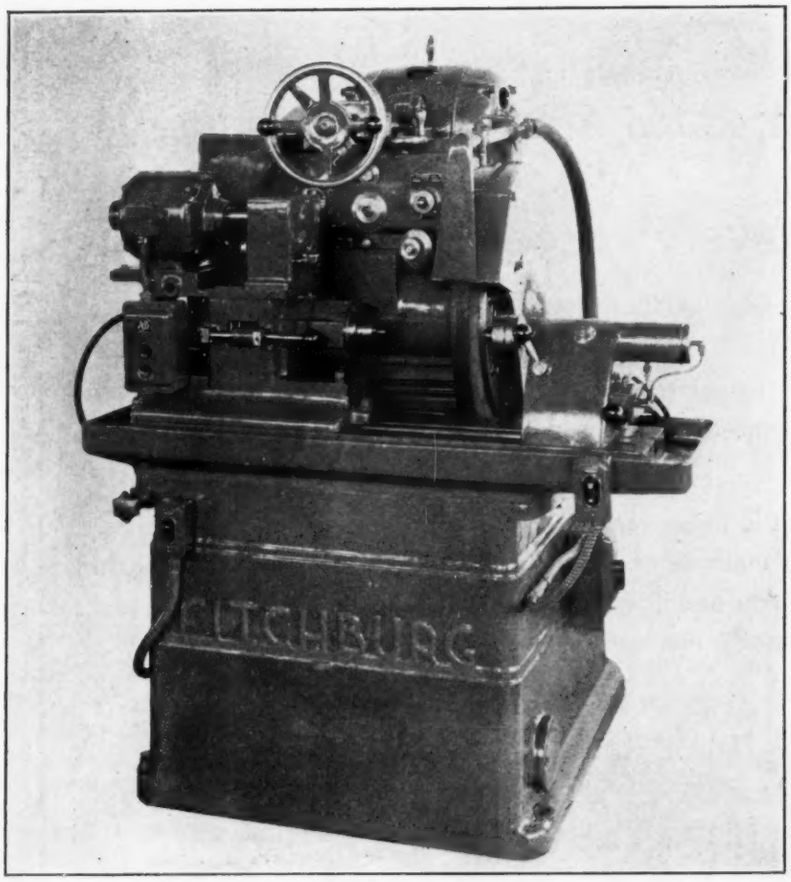


Fitchburg 6x12-In. Plunge-Cut Plain Cylindrical Grinder

Designed to do plunge-cut grinding only, the 6x12-in. cylindrical grinder announced by Fitchburg Grinding Machine Corp., 76 Winter St., Fitchburg, Mass., incorporates the "Bowgage" wheelhead unit which has been previously described (*AM*—Vol. 81, page 465). No table traverse is provided, but the wheel spindle has a reciprocating motion. Truing devices may be furnished for semi-automatic operation; hand truing or the wheelhood mounted type may be used, depending on the work to be done.

Headstocks can be furnished for either live or dead spindle operation and the complete cycle can be interlocked for operation from one lever. A retractable headstock center with a solid footstock can be provided. Grinding wheel is carried on the right-hand side of the spindle, instead of the conventional left side, resulting in a saving of floor space. Machine can be furnished in a chucking-grinder model. The workhead can be swiveled for taper work.

Specifications: maximum swing over table, 14 in.; maximum length between centers, 12 in.; height from floor to centers, 42 in.; number of work speeds, infinite from 50 to 350 r.p.m.; diameter of headstock spindle, 2 in.; diameter of footstock spindle, 2 in.; diameter of grinding wheel spindle, 3 in.; maximum feed of "Bowgage" wheelhead on diameter, 0.125 in.; rapid traverse of wheelhead, set at factory, from 0 to 5 in.; range of grinding feed rates, infinite; dwell or spark-out time, 0 to 35 sec.; floor space required, 38 in. wide by 48 in. deep; net weight, 4,800 lb.

Wheel feed of the "Bowgage" head is obtained by a toggle action controlled by the movement of a leaf spring. Hydraulic flattening of the leaf spring by a vertical movement elongates the spring; this results in forward movement of the wheelhead. Rate of grinding feed is adjusted by a hydraulic valve through a dial on the panel. Dwell time is governed by clock-control time-delay switch. Another graduated dial, operated by a small handwheel, controls the amount of stock removal.

Doehler Magnesium Die Castings

Doehler Die Casting Co., 386 Fourth Ave., New York, N. Y., announces the addition of magnesium-base alloys to the list of die casting alloys, which includes tin, lead, zinc, aluminum and copper-base alloys. Three magnesium alloys, having a tensile strength up to 35,000 lb. per sq. in., and an elongation up to 10 per cent, have been adopted as standard. Other alloys are available to meet special service requirements.

B. & D. High-Cycle Portable Grinder

This high-cycle portable grinder announced by Black & Decker Mfg. Co., Towson, Md., is designed for general service in railway and car shops and in sheet-metal shops for work requiring an 8-in. wheel. These tools have a high power-to-weight

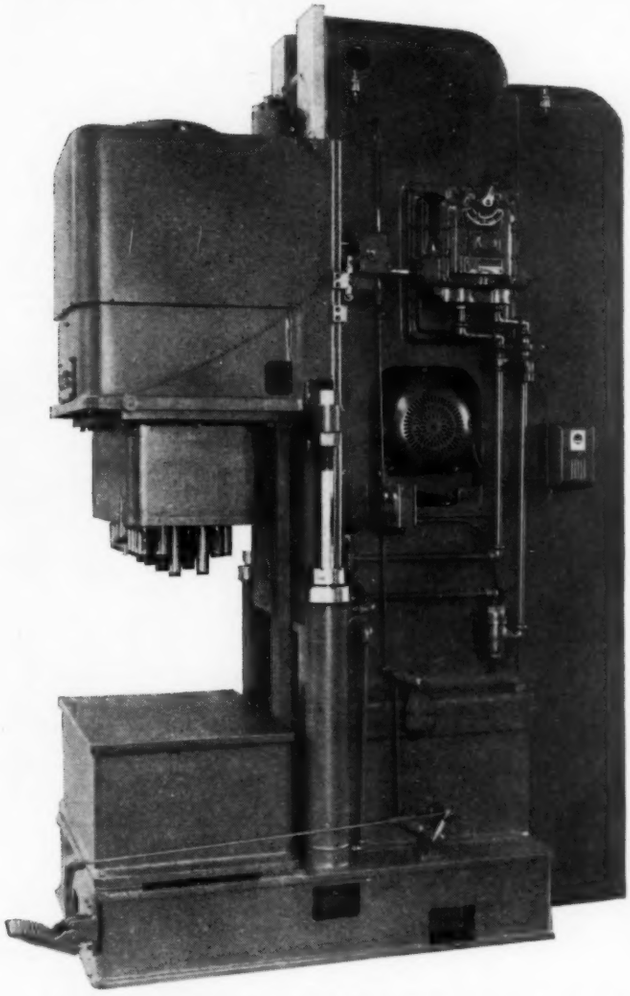
factor, and they will maintain a high grinding speed under heavy load. It is claimed that distribution of weight is such that this grinder can be conveniently used in any position. When desired, a sheet-metal wheel guard can be furnished for wire-brushing applications.

Sundstrand Model PWX Hydraulic Pumps

A line of hydraulic pump units having control valves built into the pump housing has been announced by Sundstrand Machine Tool Co., Rockford, Ill. These units are compact and are made in two sizes, the larger being the Model 10PWX and the smaller the Model 5PWX. The variable-displacement piston pump in the 10PWX unit can be furnished with three different feed rates; fast, me-

★ BAKER ★

NO. 60-HO HYDRAULIC FEED



No. 60-HO machine arranged with 32 spindle fixed center multiple head for drilling lower face of cylinder block of 8 cylinder automobile.

Illustration shows another example of BAKER flexibility for specialized operations.

A complete range of machines, both single purpose and quick change types, is available for drilling, boring, and tapping operations.

Send blueprints or sketches of your particular operations, and we will be glad to make definite recommendations.

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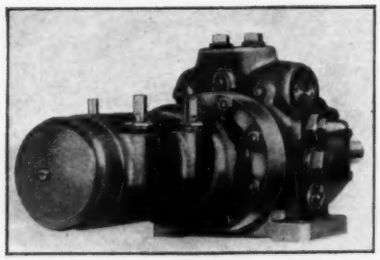


dium and slow feed, each of which is independently adjustable. In addition there is a constant-volume pump which provides rapid traverse. Both pumps are driven by a single shaft.

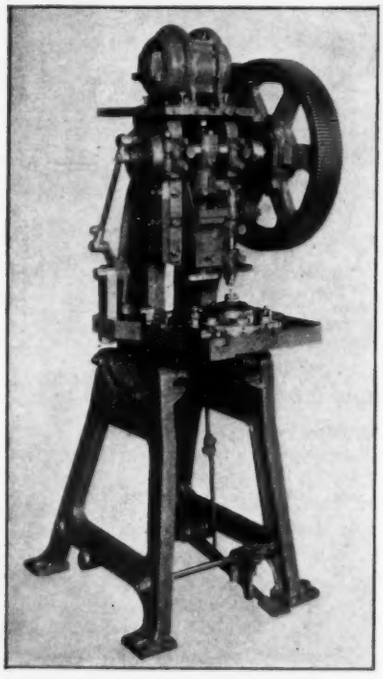
The main control mechanism may be actuated by a simple hydraulic remote control valve which is tripped by dogs on the moving member. An alternative control is electrical switches and trip dogs in conjunction with solenoid valves. The same control arrangement is used for the Model 5PWX unit which has two independently adjustable feed rates in addition to rapid traverse.

Toledo No. ¾ Press for Etching Parts

This No. ¾ open-back inclinable press has been adapted by the Toledo Machine & Tool Co., 1420 Hastings St., Toledo, Ohio, for etching, with acid, a trade-mark and number on hardened steel parts. Attached to the slide is a rubber-stamp die which is rotated 180 deg. at each stroke of the press.

An eight-station dial feed carries the parts. The back stamp die comes down, touching a pad of acid, with each stroke of the press. On the next stroke the die rotates 180 deg. to the front and applies the stamp to the work carried under the die by the dial feed. At the same time the die previously in the front position has rotated 180 deg. to the rear to pick up more acid for the next impression. A piece is etched for each stroke of the press and is continued around the dial to be dropped through a hole in the bolster into a container.

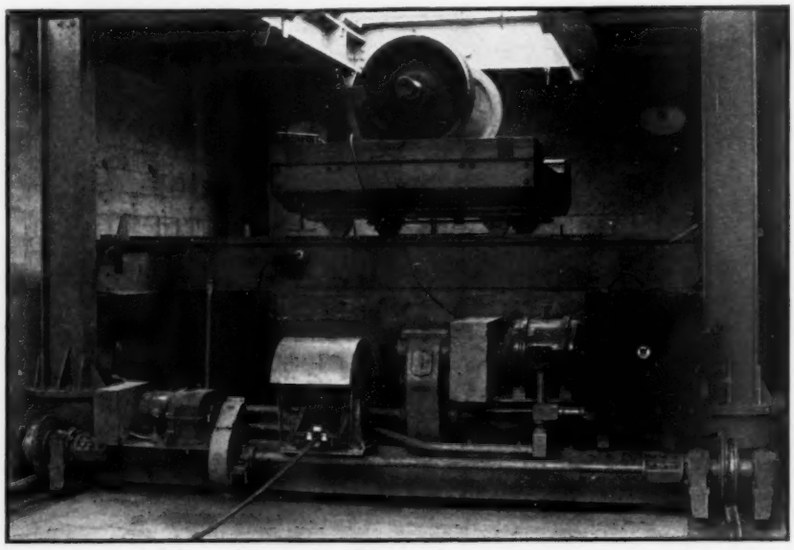
The Toledo No. ¾ press has a 1½-in. stroke, a 6-in. shut height on the bed and a 1-in. thick bolster. A ½-hp., 900-r.p.m. motor is geared directly to the flywheel.



Williams "Supertong" Chain Pipe Tongs

"Vulcan Supertongs," drop-forged from alloy and high-tensile steel and equipped with alloy steel chain that has been heat-treated and cadmium-plated, have been announced by J. H. Williams & Co., 75 Spring St., New York, N. Y. They are available in eight sizes, for pipe ranging from ⅛ to 18-in. diameter.

Whiting Compound-Table Unit for Model B Drop Pit Tables

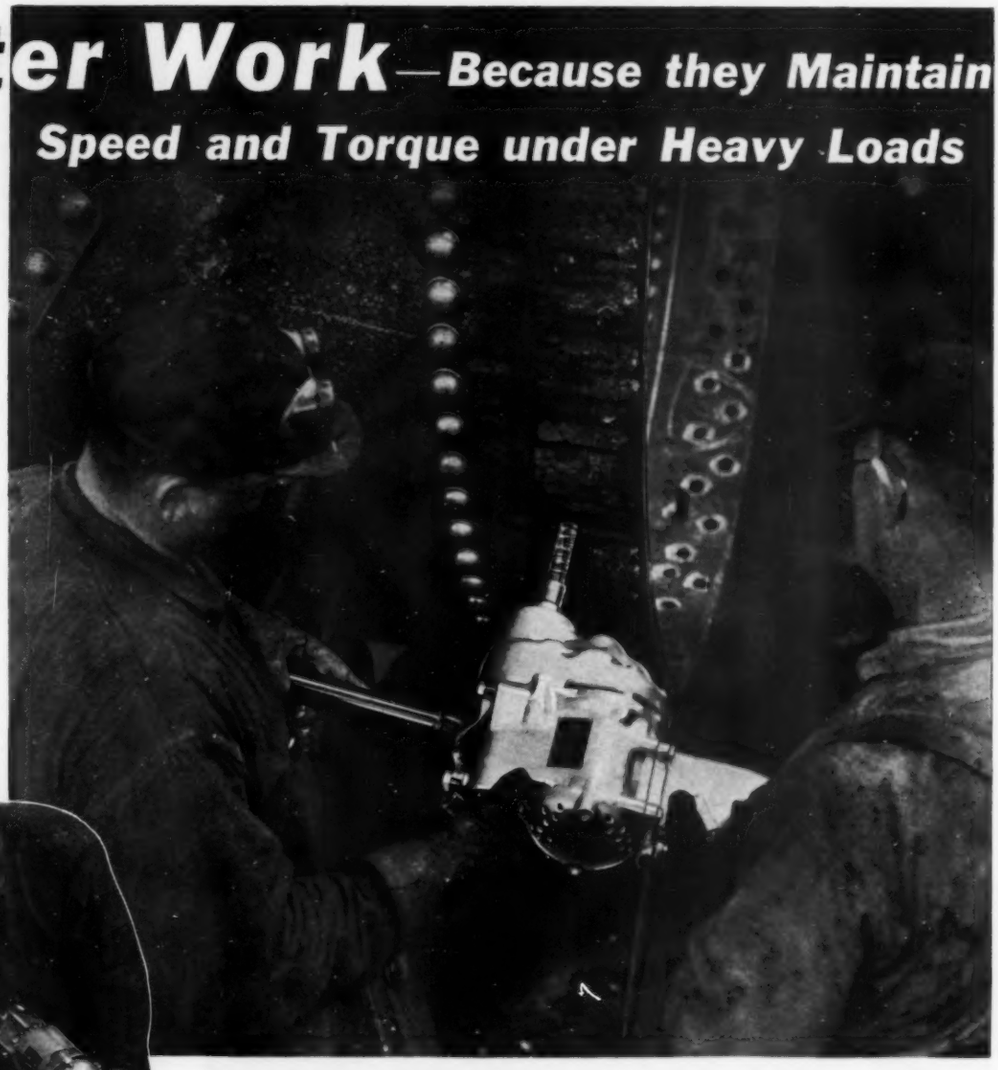


Model B drop pit tables, offered by Whiting Corp., Harvey, Ill., are now available with a compound top, permitting the handling of either single pairs of wheels or complete four- and six-wheel trucks such as are used on high-speed diesel-electric trains and pullman cars. The unit shown is of 60 tons capacity and the large top is shown locked at ground level while the small top is lowering a single pair of wheels. The drop table is motor-racked and has a hoisting speed of 4 ft. per min. These tables are made in sizes and capacities to suit local requirements in the car shop or round-house. This installation has a hoisting speed of 4 ft. per min. The large table top of this unit measures 17 ft. across the pit and is 11-ft. wide; the small top measures 5 ft. lengthwise.

When a complete truck is to be removed, the small top is locked in the inoperative position and the truck to be removed is run onto the combined top. The superstructure of the machine is then moved upward until it engages the bottoms of both tops and is continued until the four locking bars in the large top can be released. Both tops are then lowered as one unit until the truck to be removed clears the locomotive or car. The machine is then power racked to the releasing track and the large and small top raised to ground level for truck release.

Retractable wheels on the small top will allow it, with its load, to be rolled on the track of the machine superstructure to the side wall of the drop pit for release, after the top has been lowered sufficiently to clear the

Faster Work—Because they Maintain Speed and Torque under Heavy Loads



HIGH CYCLE GRINDERS and other abrasive tools have a high power-to-weight factor making them ideal for use in plants, shops and on construction work. Their maintenance of a high grinding speed under heavy load gives faster, smoother work because the abrasive wheel is always being run at the correct speed for most efficient grinding. Illustrated below, the 8" High Cycle Portable Grinder.

HIGH SPEED REAMING on structural steel and maintenance work with the Black & Decker-Van Dorn No. 3 High Cycle Reamer. High Cycle Tools speed up maintenance and construction work because they maintain speed and torque under heavy loads—registering only a 20% decrease in speed between no-load and stalling points, instead of up to 60% speed-loss, usual with other types of Tools.

FIND OUT how Black & Decker High Cycle Tools will cut your maintenance and construction costs. Our High Cycle Engineers will be glad to make a study of your operations—without cost or obligation on your part. For further information, write: High Cycle Division, Black & Decker–Van Dorn, 716 Pennsylvania Avenue, Towson, Maryland.

BLACK & DECKER-VAN DORN High Cycle TOOLS

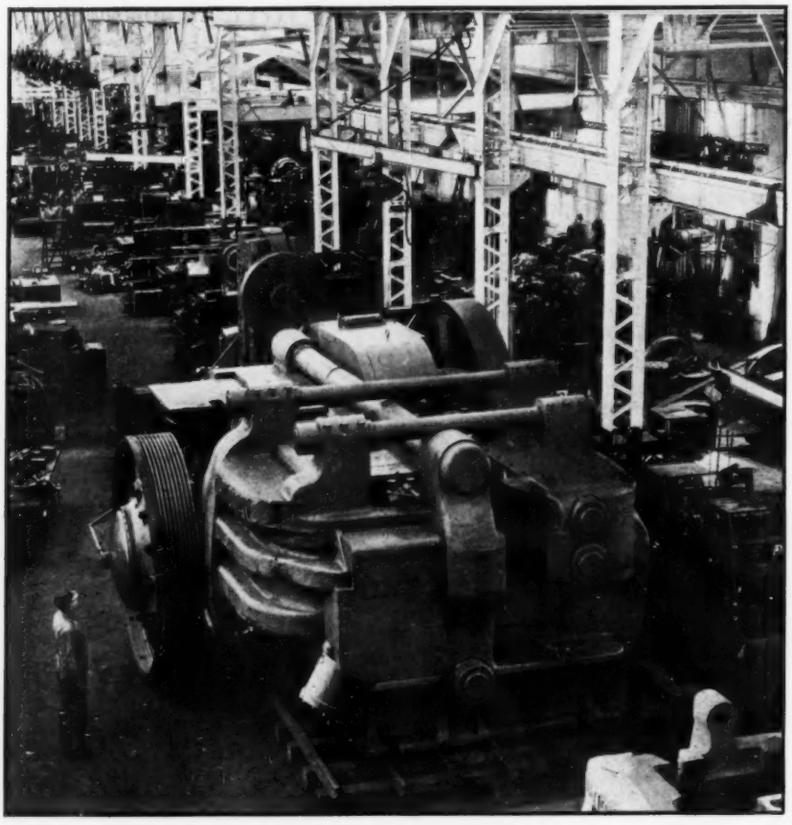
DRILLS REAMERS SCREW DRIVERS NUT RUNNERS TAPPERS STUD SETTERS SANDERS GRINDERS DIE GRINDERS

Made by the World's Largest Manufacturer of Portable Electric Tools

large table top shown directly above, moved sidewise in the pit by means of the racking motor and raised to ground level. The same locking bars that lock the small top to the large top are used to lock the small top to the side wall of the pit when rolling the wheels to the releasing track.

The large top consists of a rectangular frame with side girders, spanning the pit and made sufficiently heavy to support the weight of the locomotive resting on the top. These two heavy girders are equipped with four locking bars which engage sockets in the side walls of the pit. This rectangular frame has other cross members riveted to it to provide a well at its center into which the small table top fits. End and center cross members are connected by additional members, at the upper surface of which are rails on which the locomotive can run over the large top.

The small table top consists of a steel rectangular frame with cross girders within, on the upper surfaces of which are rails coinciding with the rails of the large top.



National "High-Duty" Forging Machines

Two "High-Duty" forging machines, said to be larger than any such machines previously built, have just been shipped by The National Machinery Co., Tiffin, Ohio. These machines are intended for upsetting operations on tubing and will handle sizes as large as 13 to 14 in. diameter. Design is similar to standard types of National forging machines and includes a massive underslung bed frame, suspended over-arm type heading and gripping slides, longitudinal and cross tie-bars and an air-operated friction clutch. It was necessary to make the bed frame of each of these machines in two sections, each of which is as large as can be shipped.

Stroke of the heading ram is 30 in. and gripping dies up to 52-in. long are used. Net weight of machine is 500,000 lb. and a 150-hp. motor is required for the drive. Size of these machines may be indicated by the fact that twelve men can stand in the die-box space.

Hebard "Shop Mule" Industrial Tractor

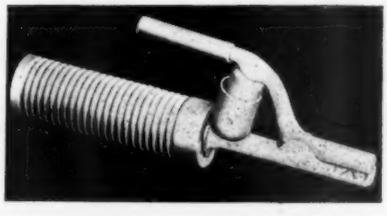
The "Midget Shop Mule" gasoline-engine powered industrial tractor, manufactured by W. F. Hebard & Co., 433 S. Jefferson St., Chicago, Ill., is designed to operate in narrow runways and congested areas, such as are found in industrial shops and yards, warehouses and railroad terminals. The tractor measures 76 in. long, 40 in. wide and 50 in. high. It can be turned inside a box car.

Drive components are: International Harvester No. P-12 engine, an International No. C-1 three-speed truck transmission, and Ford V-8 differential and semi-floating axles. It is claimed that the unit will operate on 3 to 5 gal. of gasoline per 8-hr.

Specifications: draw-bar effort, 2,800 lb., weight, approximately 3,500 lb. with 1,390 lb. on front axle and 2,030 lb. on rear axle.

Jackson Model B-4 Electrode Holder

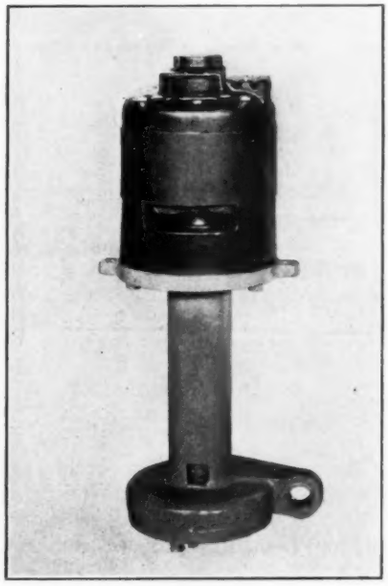
Weighing 15 oz., the Model B-4 electrode holder announced by the Jackson Electrode Holder Co., 6553 Woodward Ave., Detroit, Mich., has a current capacity of 200 amp. and handles rods ranging from 1/16 to 3/16 in. diameter. The metal parts of this holder are made entirely of Mallory 3 metal, which is claimed to have 85 per cent of the conductivity of pure copper. Handle insulation is thoroughly ventilated. Upper tong and compression spring are protected by fiber insulation. This holder is claimed to be small enough to permit use in tight places.



Goulds Centrifugal Coolant Pump

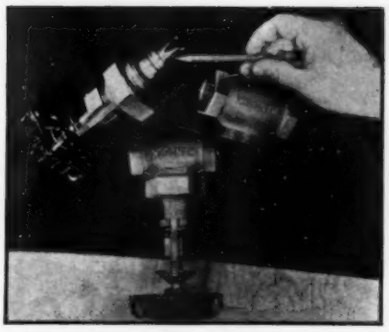
This compact, vertical, submerged-type centrifugal pump offered by Goulds Pumps, Inc., Seneca Falls, N. Y., is built in the ¾-in. size only and is designed especially for the circulation of coolant, cutting compounds, or similar liquids containing abrasives in suspension. Impeller is mounted directly on the large diameter, extended motor-shaft which eliminates the necessity for any lower-pump bearing. Pump casing is cast integral with the motor support, at the top of which the motor is held in position with a male and female lock to insure permanent alignment.

Impeller is of the open-double suction type, and is hydraulically balanced to eliminate end thrust. Clearances between impeller and the casing are sufficient to remove any possibility of binding from chips. These pumps are available in capacities up to 30 gal. per min. and with heads up to 19 ft. A ¼-hp., 1750 r.p.m. motor is used.



Hancock Bronze "Flocontrol" Valves

Hancock Valve Div., Manning, Maxwell & Moore, Inc., 3 Elias St., Bridgeport, Conn., has announced a completely redesigned line of bronze "Flocontrol" valves. These valves retain the basic proportional-flow or straight-line flow characteristics of the original valves. Stainless steel valve seats and disks having a hardness of 500 Brinell are used. Body of the valve is now of the union bonnet type instead of the inside screw bonnet originally used. These valves are suitable for temperature control of gas-fired, oil-fired, or steamheated processes, for proportional blending of liquids, water-softening systems, oil burner lines and similar uses.

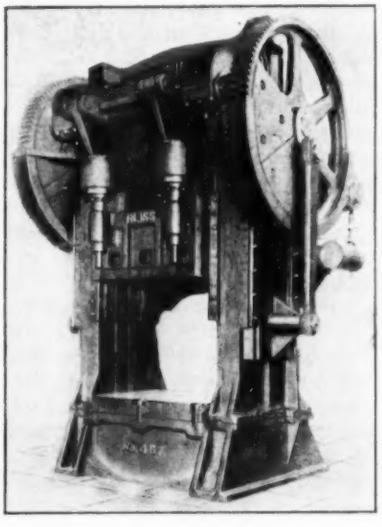


Williams Combination Pipe-Vise and Bender

The No. V-1 "Vulcan" vise stand announced by J. H. Williams & Co., 75 Spring St., New York, N. Y., combines a chain pipe-vise and pipe-bender in a complete stand. Base is made of malleable iron and is well reinforced. Legs are of 1-in. diameter pipe with upset feet, punched for fastening to the floor if desired. These legs fold for carrying and are held together by a simple tie chain. Vise jaw is of tool steel, hardened and tempered. Vise has capacity for ⅛ to 2-in. pipe and the bender handles pipe up to ¾-in. diameter. The complete stand weighs 35 lb.

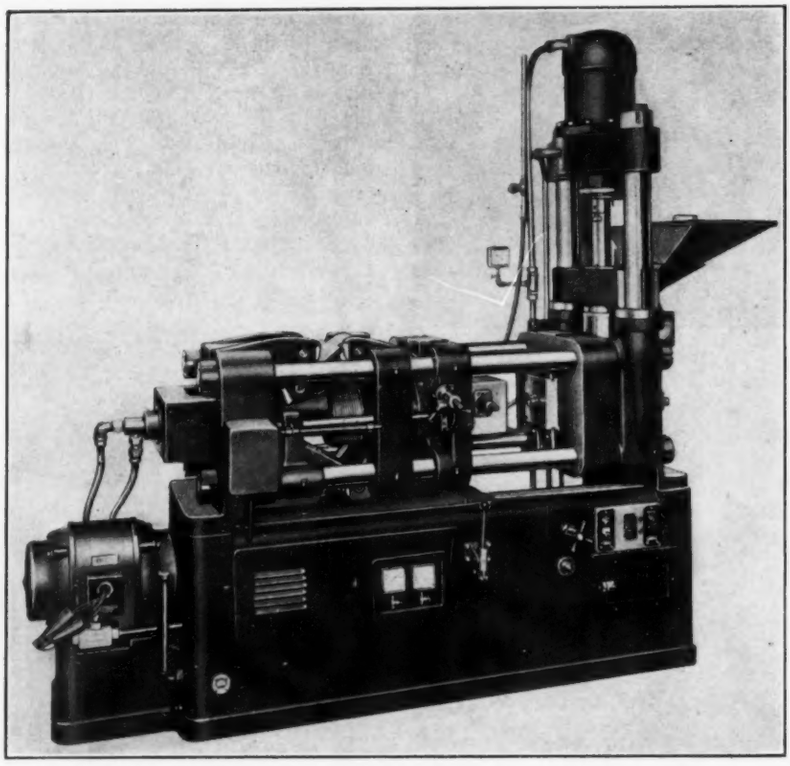
Bliss No. 407 Toggle-Type Double-Action Drawing Press

The No. 407 double-crank, double-action, straight-side toggle drawing press announced by E. W. Bliss Co., 53rd St. & Second Ave., Brooklyn, N. Y., is a long-stroke model having a frame made of four separate castings held together by shrunk-in steel tie-rods. A 35-hp. motor drives the flywheel through V-belts. This in turn drives the double-geared, twin-drive train of gears.



Control is completely electric, with pushbuttons to start, stop or inch the press. Clutch is full-automatic and is air operated. It is combined with a brake and the unit is mounted in the flywheel.

This press provides positive gripping for stretching jobs with draw beads and can draw a shell 10-in. deep. It can be converted into a triple-action press by the addition of Marquette drawing cushions in the bed. Specifications: diameter of crankshaft at bearings, 7 in.; diameter of crankshaft at pins, 8 in.; plunger stroke, 21 in.; blank-holder stroke, 14 in.; shut height bed to blank-holder, stroke down and adjustment up, 34 in.; thickness of bolster, 6 in. Crankshaft and intermediate shaft have renewable bronze bushings while the driveshaft is mounted on Timken roller bearings.



Index Model LPM-2 Automatic Plastic Injection-Molding Machine

Fully automatic in operation, the Lester designed Model LPM-2 injection molding machine for thermoplastic materials, announced by Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio, is suitable for the injection of large articles, with a maximum weight of 6 oz. per casting. The machine can be operated automatically or semi-automatically. Full-automatic operations of the machine are controlled by two electric clocks and all controls are arranged within easy reach of the operator.

Molds are closed by hydraulically operated toggle joints. These joints are firmly locked by tapered surfaces when the mold is closed. As a result of this construction, it is claimed that the machine is capable of holding the mold closed for the injection of an area of 40 sq. in. Adjustment of the mold on the tie bars is accomplished through the use of a worm and worm wheel by which the die plates are advanced uniformly, thereby insuring parallelism of the die plates at all times. Tie bars are $3\frac{1}{4}$ in. diameter.

Heating cylinder is chromium plated and is constructed so that all adjustments can be readily made. This cylinder swings away from the machine, affording easy accessibility for adjustment.

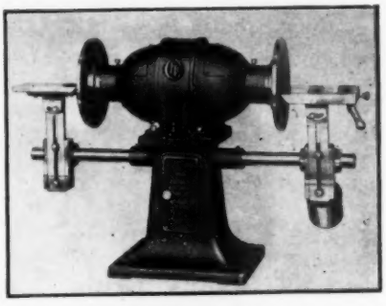
The injection stroke of $8\frac{1}{2}$ in. is accomplished in 3 sec. This machine is a self-contained unit and is ready for operation upon installation of a 10-hp. driving motor. Base of the machine serves as an oil reservoir for the hydraulic system.

Machine can be furnished with any one of three sizes of pistons or with all three sizes, depending on individual requirements. Specifications: pressure on material, using 3.2 sq. in. area piston, 16,000 lb. per sq. in.; pressure on material, using 2.75 sq. in. area piston, 19,000 lb. per sq. in.; pressure on material using 2.0 area piston, 25,000 lb. per sq. in.; injections per hour, 30 to 500; capacity of heating cylinder, 50 lb. per hr.; mold capacity of injection area, 40 sq. in.; maximum die space, 14 in.; minimum die space, 4 in.; die opens, 7 in.; clearance between tie bars, $11\frac{3}{4}$ x $13\frac{3}{4}$ in.; stroke of injection piston, $8\frac{1}{2}$ in.; total pressure on material, 50,000 lb.; capacity of hopper, 25 lb.; height over-all, 100 in.; floor space required, 96 x 36 in.; net weight, without motor, 11,000 lb.

Cincinnati Double-End Disk Grinders

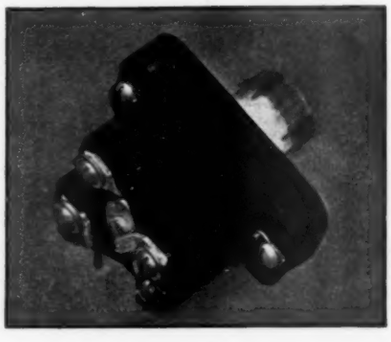
Several sizes of disk grinders, available in the double-end disk type shown, or with a disk on one side and a conventional grinding wheel and wheel guard on the other side, are announced by The Cincinnati Electrical Tool Co., Madison and Edwards Roads, Cincinnati, Ohio. Disks are of steel, balanced to insure true running.

A table with hand-lever feed is regularly supplied on the right-hand side of the machine and a plain table is mounted on the opposite side. This arrangement may be changed to suit individual requirements. A table with hand-lever feed is furnished on the right-hand side of the combination type units; the fully inclosed safety wheel guard for the grinding wheel being mounted on the left-hand side.



G. E. Illuminated Pushbutton Station

A small, standard-duty, pushbutton station incorporating an indicating lamp in the center of the translucent button is announced by General Electric Co., Schenectady, N. Y. Combining the pushbutton and the indicating lamp in a single unit makes possible the installation of an indicating control station in one-half the space formerly required by the two devices when mounted separately.



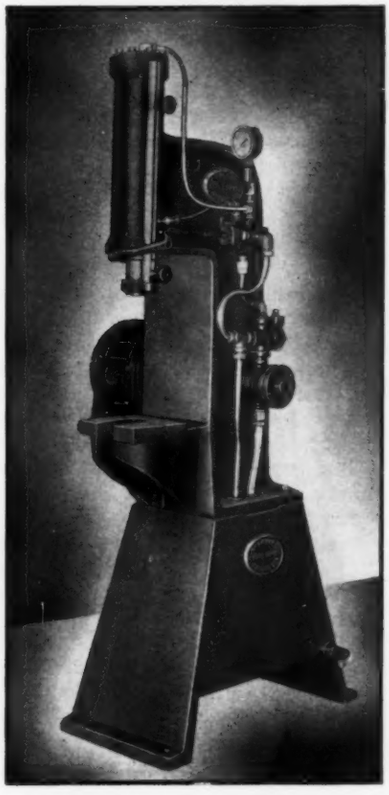
These units are available with buttons in six colors: white, green, blue, red, clear and amber.

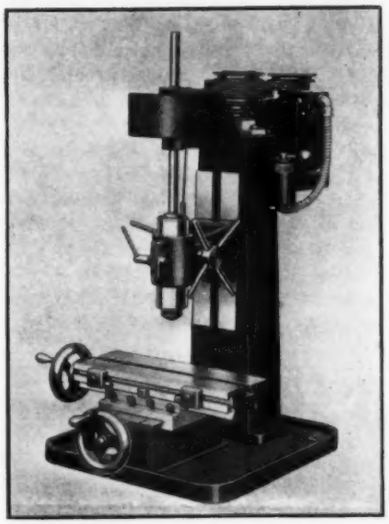
Indicating lamp is operated through a small control transformer which, because of its small size, can be mounted in or on the machine. The pushbutton station measures $2\frac{5}{8}$ in. high, $1\frac{1}{4}$ in. wide and $2\frac{5}{8}$ in. thick.

Greenerd Hydraulic Arbor Presses

These 2- and 4-ton hydraulic arbor presses, offered by Greenerd Arbor Press Co., P. O. Box No. 415, Nashua, N. H., are equipped with a $3\frac{1}{2}$-in. diameter steel piston having three cast-iron piston rings. Motor and hydraulic pump are mounted on opposite sides of the main housing and the pump is connected between a 16-gal sump in the base and a pair of hydraulic valves which are mounted on the side of the frame.

Ram is put into motion by hand lever control and pressure will remain on the work until the lever is released, which automatically returns the ram to a power stop. The stop may be set at any predetermined point within the 16-in. stroke of the ram. Each press has an adjustable stroke from 1 to 16 in. Pressure may be set at any point between $\frac{1}{2}$-ton and full capacity. Table measures 8x8 in.





Linley High-Speed Vertical Bench Miller

Designed for small work, such as dies, jigs, fixtures, molds for plastics, and for all types of drilling, milling and boring operations, this high-speed vertical bench miller is offered by Linley Brothers Co., 581 Fairfield Ave., Bridgeport, Conn. Drive is by a $\frac{1}{3}$-hp., 1,725-r.p.m. ball-bearing vertical motor mounted at the rear of the column. Table has a $14\frac{1}{2}$x$5\frac{1}{2}$ in. working surface with a $\frac{1}{2}$ in. T-slot through the center. Longitudinal travel of table is 10 in. and cross travel is 5 in. Table, saddle and bed ways are hand scraped and are gibbed to provide accuracy and rigidity. Screws are fitted with replaceable bronze nuts and have dials graduated in thousandths. Saddle can be locked in position and an adjustable stop-gage is provided for the longitudinal travel of the table.

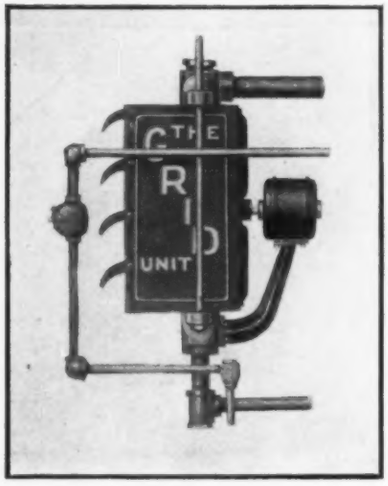
Spindle is equipped with precision, preloaded ball bearings and the spindle pulley runs on separate ball bearings. V-type belts are used on a compound drive which gives eight spindle speeds of 275, 430, 550, 860, 1,250, 2,125, 2,500 and 4,250 r.p.m. Spindle is arranged for collets, which can be furnished in sizes up to and including $\frac{1}{2}$ in. to take straight shank mills.

Vertical travel of spindle is 3 in. and the spindle can be locked in position for milling operations. Sliding head has a movement of 8 in. and, in upper position, allows 11 in. between spindle end and table top. Motor is mounted on an adjustable bracket to allow for belt take-up. A reversing switch is provided to operate the motor in either direction. Shipping weight is 300 lb.

Unit "Grid" Humidifier

A humidifier, designed to be attached either in front of or directly behind a unit heater, is announced by The Unit Heater & Cooler Co., Wausau, Wis. No air lines or extra piping are necessary for the installation.

Unit may be operated with the unit heater or as an individual unit and, even though the fan on the unit heater may be shut down, the humidifying action continues to function until such time as desired conditions are attained. When this condition is reached, controls on the humidifier automatically shut it off.



"Rigid" Chain Vise

The "Rigid" chain vise, introduced by Ridge Tool Co., Elyria, Ohio, includes a pipe rest and pipe bender. Frames are made of malleable metal and jaws of high quality tool steel, hardened for firm grip and long wear. Four sizes—2, 4, 6 and 8 in.

Cleaning the Spray Booth

JOHN E. HYLER
R. G. Le Tourneau, Inc.

In cleaning the booth where articles are sprayed with paint, steel tools should never be used for scraping the surfaces, for such tools may strike sparks and cause fire or explosion of volatile gases set free from the paint.

Some spray booths are so designed that the surfaces over which the paint-laden air must pass to the ventilating stack are made in the form of plates having openings between them, permitting air to pass to the exhaust from all parts of the booth, and which are removable so that they can be taken out of the booth for cleaning. The ability to clean them in this manner is significant from the standpoint of safety, for each plate can be taken off by itself. Under such conditions the plates can be cleaned without danger, since ignition of the volatile matter on a single plate would be relatively unimportant as against such an occurrence in the booth.

As for the floor of the booth, it is good practice to cover it with wrapping paper after it has been cleaned. Accumulation of volatile matter is deposited on the paper instead of the floor and the paper can easily be removed.

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Should the Worker Share in Profits?

HERBERT F. CRAWFORD

There is food for serious thought in the article "Should the Worker Share in Profits" (*AM*, vol. 81, page 360). The author has evidently been a close observer of the problems involved and the solutions attempted. Although not stated specifically the article seems to deal with concerns in which capital and management are identical, where the management owns the business, using its own capital. Both because of the large number of concerns in which the manager is as much of a "hired-man" as the man in the shop, and because of the entirely different functions of capital and management, they should be considered separately.

Neither capital nor labor is an asset unless it can be employed. When unemployed, both are liabilities. Capital must be guarded and labor must be fed and housed. Capital requires both management and labor to make it of value. Profits depend on the way in which management and labor make use of capital. It would seem, therefore, that capital should not expect as high a return as either management or labor.

Although actual production depends on labor, profit or loss depends mostly on management, both as to shop methods and to the business end. The manager is the "enterpriser" whether he is the owner or simply a hired man. As such he may deserve a larger share of profits than either capital or labor. Profits would not be possible, however, without the cooperation of labor. And as labor is also the world's greatest customer it is necessary that labor receives sufficient yearly income to permit the purchase of its products. This is far more important to secure continued business than extra dividends to stockholders.

Management is, however, confronted with several serious problems. Unless it satisfies stockholders, they hire a new manager. Large dividends, however, may prevent prices

that will attract or enlarge business. They may also cause labor troubles that may cost more than higher wages.

As a rule labor is more interested in steady employment than in peak wages or bonuses. As business fluctuations prevent any absolute guarantee of continuous work, various forms of yearly wage payments are being tried in some places, as pointed out in the article. Some of these include a bonus at the end of a good year. With harmonious relations between management and men, as pointed out by Mr. Forbes (*AM*—Vol. 81, page 391) lack of such a bonus in a bad year should be easily understood and accepted. The desired harmony cannot be expected, however, if the management has taken a huge bonus or has paid large extra dividends during a boom year entirely disproportionate to the bonus paid to labor.

With labor informed in a general way as to the state of business, with fair distribution of profits when there are any, labor can be made to understand most of the problems that affect it. Assured steady income with a little extra in good years, and without stock entanglements, seems to be a possibility. Losses through bad management or speculation will not, however, be calmly accepted by labor in reduced income. Such losses are no fault of labor, which should not be penalized for them. They might be absorbed by reserves which may also have to carry labor in periods of slack business. Modifications of the undivided profits tax law will probably consider this factor and exempt a percentage of surplus to act as a shock absorber for emergencies.

Cooperative Apprentice Training

Only large plants can maintain regular apprentice training schools and most of these are greatly curtailed during a depression. Yet when business begins to come back the lack of skilled men handicaps recovery. Few small shops can hope to give thorough training except in their own line of work. Cooperation of industries in a community has been frequently attempted but is seldom as satisfactory as anticipated. That such cooperation is possible, however, is shown by the result of the Six-City Apprenticeship Program of Moline, East Moline, Rock Island, Silvis, Ill., together with Davenport and Bettendorf, Iowa, which has been in operation for over ten years. And this period includes one of the worst depressions in history.

These cities have 44 industries that employ from 30 to 4,200 workers each, the total number of employees being over 21,000. The industries vary widely and include fourteen trade classifications. Each city has its own local government and school system. Bearing these facts in mind, the comments of Harold S. Falk, V.P. of the Falk Corp., whose interest in apprenticeship is well known, are of special interest. He says, "If the organization of manufacturers for apprentice training is possible in such a confusion of municipal and state administrations, it ought to be possible under any circumstances."

Briefly the plan covers the shop, the public schools and the International Correspondence School. There is a full-time district apprentice supervisor and an apprenticeship committee. A foreman in each shop is made responsible for supervision of trade practices, except in shops large enough to afford a full-time instruc-

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CINCINNATI BICKFORD

tor. Lessons are provided by the correspondence school which enables each apprentice to advance at his own rate so far as written instruction is concerned. Public high schools give each boy four hours a week on prescribed subjects on company time.

This, in brief, is the plan. Ten years of successful operation proves that it is practical when properly administered. With this as an example there should be little hesitation on the part of other communities as to the advisability of learning the details.

Engineering Employment

Ordinarily only non-professional workers are primarily concerned with the stability and security of employment. The effects of the recent depression years, however, were such as to increase the interest in the subject of economic security among professional workers. Because of this, the Bureau of Labor Statistics included a series of questions relating to this subject in its recent study of the engineering profession.

Data supplied by 35,559 engineers indicate that 68.4 per cent of all professional engineers used personal contacts and recommendations to obtain jobs. Those who used this medium, together with those who obtained their positions through the Civil Service, formed nearly four-fifths of all reporting. The degree of economic security among professional engineers, as evidenced by possession of an employment contract covering some period of time, or by pension privileges, is negligible.

In general, there appears to be little restriction upon professional engineers with regard to patent rights to inventions made by them. The extent of restriction, however, depends largely upon the engineer's field of employment and the type of work in which he engaged.

Figures prepared from these reports indicate that, for the engineering profession as a whole, placement was not the function of any particular organization. Personal contacts and recommendations, together with Civil Service, accounted for 74.2 per cent of the mechanical and industrial engineers. Although the percentage distribution for the remaining avenues of employment do not embrace large numbers of each professional class, relatively they do present some striking contrasts. Only 2.4 per cent of all engineers reported that they obtained their positions through an engineering society. Despite the fact that so few engineers reported an engineering society as their employment medium, it must be recognized that such societies are an important factor in obtaining employment for professional engineers. It is obvious that through their members there must inevitably be a pooling of information on employment prospects, both locally and nationally.

Furthermore, the officials of the various societies are kept in close touch with local and national employment conditions as a result of their meetings and conventions; but such appointments as are made would depend rather upon personal contacts and recommendations than upon contacts made through the society's employment service. The fact, therefore, that only 2.4 per cent of all engineers reported the engineering society as their medium of employment must be interpreted in the light of these conditions.

The securing of employment through newspapers and technical journals was reported by 1.6 and 1.0 per cent, respectively, of all engineers making returns. It should be noted, however, that, relatively, elec-

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trical and mechanical and industrial engineers found more jobs through newspapers than did any of the other professional classes; this medium was reported by 1.8 per cent of the electrical and 2.6 per cent of the mechanical and industrial engineers whereas among the other classes the highest percentage was 1.1 per cent.

Few Contracts

A written contract of employment and pension privileges are two important criteria of economic security. The importance of Civil-Service status as a factor in stability of employment was demonstrated in the report. Despite the fact that in all 11,177 of the engineers reporting were in the employ of public authorities, only 45.0 per cent of them reported as being under Civil Service. For the engineering profession as a whole, the report clearly evidenced a lack of economic security in terms of a written contract which would secure employment over a substantial period of time. For engineers under contract in the personal service field, the most common contract period was from one to two years. Only 1.4 per cent of all reporting engineers stated that they were under a contract for a definite period of time during which they bound themselves not to seek similar employment. Clearly, restrictions upon professional engineers with regard to new employment were few.

From an analysis of the reported pension privileges, it is evident that the kind of employment has a marked effect upon the question of the installation of a pension scheme. In no type of engineering employment was a majority of the reporting engineers protected by such a plan.

Abstracted from bulletin "Security of Employment in the Engineering Profession," Serial No. R. 561, published by Bureau of Labor Statistics, U. S. Department of Labor.

Politics and Economics

A. W. FORBES
Forbes & Myers

"Opinions differ sharply as to whether political forces are strong enough to stem economic tides. For our part we do not believe so, and we base our relief on the experience of the last two political administrations. Despite the strongest efforts of both the economic cycle proceeded, practically unaffected."

This quotation is from an editorial "Recovery: Next Stage" (*AM*—Vol. 81, page 390a).

But why should we assume that the economic cycle proceeded, practically unaffected? Why was this depression so much more severe and so much longer than previous ones unless it was in some way affected? To those of us who opposed the economic policies of both administrations, the relation of cause and effect seem quite plain.

First, under Hoover, economic laws were defied. While maintaining a financial policy that forced reductions in prices and wages, the attempt was made to hold up both to impossible levels. Added to this was an unsound spending program. As a result prices, wages and spending were all forced to lower levels than would have been necessary under sound economic policies.

Second, under Roosevelt, after most of the necessary adjustments had been made, after remarkable progress had been made toward business recovery in the first three months of his first administration, and when every sign pointed to further improvement, unsound economic legislation was applied, and during the two years of the NRA, improvement

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almost stopped. With the removal of some of this unsound legislation in 1935, business improvement again made rapid progress.

In both administrations, excuses were offered for the failure to make more progress. In the first, the attempt was made to lay the blame on Europe and world conditions. In the second, it was claimed that the conditions left by the former administration were worse than anticipated. While there was doubtless some truth in some of these excuses, in the main they were nothing but attempts to cover up the failure of pet, but false, economic theories.

Economic forces have been shown to be supreme, but not economic tides as stated in the editorial. When economic forces are defied by a nation, as they have been under the past two administrations, trouble is inevitable.

What lies ahead? No one knows, for it depends too much on politics. Anything from an inflation boom to a deeper depression than the last is possible, but considering the political situation, a moderate inflation boom seems the more likely for the next year or two.

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How a Physiologist Looks at Wage Incentives

Any problem involving the activity of man in any situation is a physiological problem. Time study, motion study, and wage incentive methods merely define specific situations. The physiological basis of these is different in no fundamental from that of any other problem of management.

Physiology is involved in each problem of management that has to do with the activities of an employee. But physiology is only one part of the problem; equally in each, in time study, motion study, and wage incentive methods, there are other parts: economics, sociology, psychology. All are closely integrated, and all parts must be studied simultaneously. A man who achieves utmost success in management must be one who, if not an expert, is at least well grounded in all the contributing fields. He must be an economist, a psychologist and a physiologist.

There is an unfortunate tendency in regard to all physiological matters pertaining to the employee to focus attention upon or to limit attention to the working hours of the day. This very natural tendency to simplify the problem has so emphasized this period as at times to give the impression that factory employment is potentially harmful. Any physical deterioration of the employee is correspondingly blamed upon his employment. There are unfortunate situations in which unquestionably the deterioration does arise from the conditions of employment, but such situations are as correctible as they are inexcusable.

Putting aside for a moment such definitely hazardous situations, which are correctible, we come back to the fact that the occupation and the conditions of occupation encompass only some 42 hours a week out of a total of 168 hours. For three-fourths of his time—126 hours a week—the employee provides his own management. What he does during those 126 hours is far more important to his well being than what he does during the 42 hours he spends in the shop. Often the physical and hygienic conditions of the factory are far better than those that he finds in the home and other places where he spends the greater part of his time. The things that hap-

pen in this time have far more influence on well-being, or lack of well-being, mental and physical, of the employee than do the hours of his employment.

It is during those 126 hours that—to take up merely one phase—the employee feeds himself. In recent years we have come to learn that adequate diet is not the simple matter of getting enough food to satisfy hunger. Unquestionably the diet of the employee is of very practical importance to the factory management. It is quite as important toward continued high physiological efficiency and productivity of the worker as are efforts to increase his efficiency with time study and motion study or any of those specific industrial procedures to which management has tended to limit attention. Important as it is, diet is left largely to the discretion of the worker; it is left to chance. If management ventured into the educational field in dietetics the effort could not, by any stretch of the imagination, be called paternalism, and if it were not wholly without self-interest at least the interest would be one very much to the employee's advantage.

Into the writings on motion study many conclusions of physiology find their way to the effect that it is better to move or stand so and thus, rather than thus and so, or to maintain such and such a position in regard to the work at hand. There is no basis for these statements other than opinion and guess. Certainly they are not based on any scientific study of physiological activity.

Local Fatigue

The results of motion study in determining what is intended to be an economy of effort may, if incorrectly applied, throw undue burden upon small groups of muscles. Local fatigue may then develop. A small group of muscles intensively worked may affect respiration but apparently does not call into play the increase in heart rate and heart output that even the moderate use of a large mass of muscles instantly elicits. That is the reason why effort might become less costly if it were accompanied by muscular movements that did not directly contribute to the task at hand. The small group of muscles then shares in the benefits of the increase in circulation which their efforts alone are unable to elicit. From the physiological standpoint at least, motion studies are best when they lead to the use of both arms or both legs instead of only one member.

Many of the detrimental influences experienced by people are mental rather than physical. On the physical side, age and health and nutrition are important, but equally important are managerial attitudes as interpreted and misinterpreted by the men, supervisional deficiencies, insecurity, social conditions, family, and other personal relations.

Abstracted from "A Physiologist Looks at Time Study, Motion Study and Wage Incentive Methods" by Howard W. Haggard, M.D., Yale University, and presented before the Institute of Management, June 4.

Hints for the Lathe Designer

J. HOMEWOOD

There are times when little annoyances make one feel that we have not reached the point of perfection in lathe design. I had occasion to operate one the other day where the restricted space provided for the operation of the tailstock tightening wrench subjected my hand to considerable abuse. I cannot understand why the maker should place the nut

Dynamic Balance

RIVETT roller bearing bench lathe equipped with Timken "Zero" precision mirror finish bearings provide the combination of high precision and rapid production required of a modern efficient tool. Every rotating part is dynamically balanced to insure a rigid vibrationless spindle from 100 to 2300 r.p.m. Turning tools capable of high cutting speeds can be used assuring production with work held to extremely close limits. Many manufacturers today are experiencing the production possibilities of the Rivett roller bearing bench lathe. Bulletin 505-RB provides further details.

RIVETT LATHE & GRINDER INC.
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PIONEERS IN BENCH LATHE DEVELOPMENT

in such a position that the operator must resort to contortionistic efforts. A twelve-point wrench should, at least, be provided in place of the customary hexagon-type wrench where nuts must be placed in restricted positions.

When operating another lathe of standard make, I found the lever controlling the longitudinal feed entirely too close to the carriage operating wheel. A little more clearance would have saved my left hand from a number of bumps.

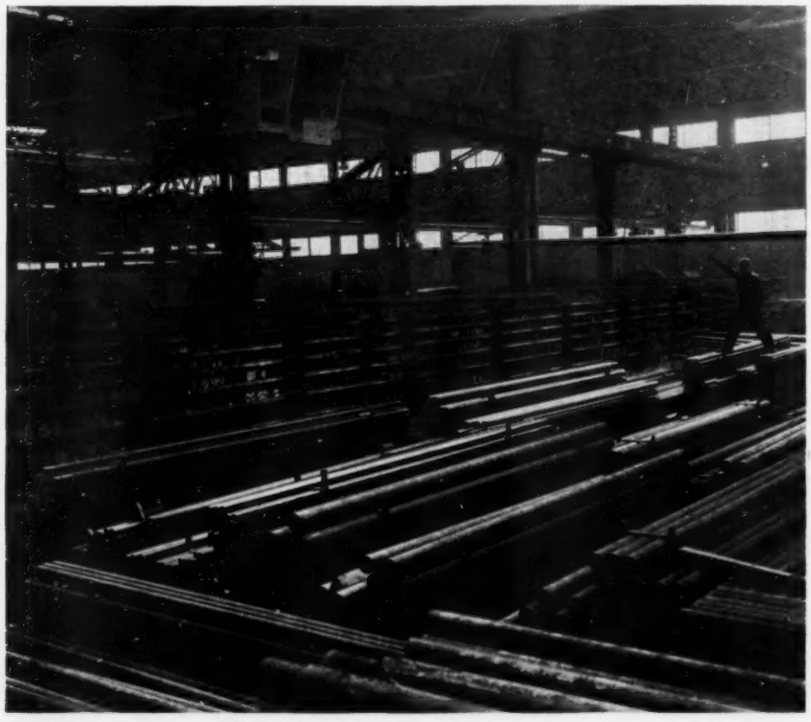
There should be a law against such inconsistencies as having the thread-cutting nut engage with a downward thrust on one make of lathe and by pulling the lever up on another. When an operator is required to use more than one machine and each is different from the other in such respects, he is likely to make mistakes.

Similar levers for different purposes are confusing when placed close together on a lathe apron. Making each lever of a different shape will help the operator to increase his production. While the knurled locknut type of graduation disk is neat, it seems to lack dependability at times. I find the knurled slotted-screw for fastening more to my liking, notwithstanding the fact that I have to reach for a screwdriver.

With little additional expense, the tailstock spindle could be made longer to facilitate drilling holes to greater depth. Would I be too radical if I were to suggest that the lathe manufacturers provide their tailstocks with screw-operating taper-pin locators for spindle alignment?

An adjustable carriage stop is a necessary accessory on a general purpose lathe and should be provided on standard equipment.

We continuously recommend three-point suspension in tool design, yet we ship lathes with four legs to every Tom, Dick and Harry. I'll venture to say that there are very few lathes in operation that are not twisted more or less by this construction.



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Safe Optics

CHARLES O. COZZENS

American industry is paying out the staggering sum of $50,000,000 annually for eye accidents. Fully one-half of this cost could be eliminated within a twelve months' period if ordinary safe methods now available, were employed.

Figures indicate that U. S. industry loses or repairs in the neighborhood of some 200,000 eyes per year. Actual cost of the average industrial eye accident is estimated at $250, while the cost imposed on industry when an eye is lost is approximately $2,000.

Types of industries leading in eye accidents at the present time, listed in order of importance, are: metal working and refining, wood industries, process industries, construction, food industries, coal mining, other mining, and utilities.

A number of important group and individual industries through employment of safety guards, goggles, and similar devices designed to protect the eyes and faces of working men have reduced eye accidents considerably. For example, a metal-working plant spent an average of $1,668 per year on eye accidents during a five-year period when goggles were required on only obviously hazardous jobs. Yearly costs were reduced to $88 when wearing of goggles on all jobs was made compulsory. Another manufacturer reduced eye injuries from a total of 103 in one year to

two in the following year with corresponding reduction in cost by the adoption of safety measures. A certain steel company estimates that it has prevented the destruction of some 6,000 eyes over a ten-year period at a total saving of $12,000,000 in compensation alone.

Falls—Industry's Greatest Hazard

Falls cause more lost time than any other class of compensatable occupational accidents, according to data recently published by the National Safety Council. In the reports of five State Labor Departments or Industrial Commissions, covering 173,000 compensated cases, falls were responsible for twenty-five per cent of the total compensation paid.

Injuries due to handling objects were more numerous but they received only fourteen per cent of the compensation. Thus, falls were somewhat more severe than the average compensated injury, while the handling objects cases were considerably less severe. Machinery accidents accounted for fifteen per cent of the compensation and twelve per cent of the injuries.

Falls caused the death of 24,520 persons during 1935, the highest total ever reached and second only to motor vehicles as a cause of accidental death. Falls caused more than three times as many deaths as burns, which were third in the fatal accident list.

Occupational falls accounted for only seventeen per cent of these deaths while seventy-four per cent of them were the result of falls in the home.

Fatal falls have been showing an unfavorable trend for a number of years. From 1928 to 1935 deaths from accidental falls increased 14 per cent, whereas all accidental deaths not involving motor vehicles decreased five per cent. The probable reason for this advance is that falls are predominantly a hazard of old age and the proportion of our total population in the older age group has been increasing.

Stainless Steels Simplified

One of the large manufacturers has prepared the following abstract of the properties of stainless steels in order to aid the engineering department, standards department and the shop:

"Straight chrome" free-machining, Type 416, is permissible wherever spot, arc, or torch welding is not encountered. It is desirable that none but the simplest bending and forming operations (90 deg. maximum) be specified, as this material is inherently cold short.

Type 303 18-8 free-machining stainless will permit reasonable bending and forming (not deep drawing) but should not be used if any amount of welding, other than spot, is required. There are two types of so-called 18-8 stainless steels—not free-machining—available, one ranging from 0.08 to 0.20 carbon, and the other 0.08 maximum carbon. This latter material is satisfactory for all types of welding, where the first type is only satisfactory for spot welding.

It is desirable to differentiate between these latter 18-8 stainless (high and low carbon) because of the price factor involved, the high carbon being the cheaper material by approximately 2 cents per pound.

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cent steels are employed where it is desirable to take advantage of the properties obtained through heat-treatment, and where the corrosion resistance is of great importance. Essentially, this means that straight chromes are acceptable protection against normal atmospheric corrosion, and when further protection is desired, recourse is to 18-8 alloy.

Type numbers are established by American Iron & Steel Institute and correspond to S.A.E. numbers on other steels.

Public Relations in Industry

In the last analysis public relations is mostly common-sense. If business would apply to public relations the same common-sense, thoroughness and imagination that it applies to engineering research, to manufacturing and to selling, the problem would be far simpler than it is.

The emphasis placed upon public relations today is altogether a wholesome sign. It indicates that more than ever before, recognition is being given to the importance of public opinion. Efforts to do what will meet with public approbation and to avoid what will arouse public criticism are shaping corporate activities to a greater extent than heretofore. Industry, generally speaking, is beginning to scrutinize more carefully what it does with reference to the effect of its actions upon the public's attitude. This is as it should be, for today public opinion is your master, and whether it is a kindly one or a hostile one is almost entirely up to you.

Publicity and public relations are different things. Public relations in its fundamental sense has to do with the creation and shaping of policies which, if sincerely practiced and effectively made known to the public, will be reflected in public good will. Publicity is merely the technique by which these policies and actions are effectively presented to the public.

In other words, public relations is primarily a matter of policy. It calls for a point of view. It first asks the question: what are the policies which govern the conduct of this business? Are they sound? Are they in the public interest? Will the public approve?

It is sometimes amazing to note what small things in a company's practices are involved in its public relations. Management is often inclined to believe that only major things, such as its labor policies, the quality of the product or the services it sells, or the prices it charges, affect the public's attitude. The fact is that almost everything about a company, including even the attitude of its employees toward the company outside of working hours, is reflected in the net effect of what people think of it.

Industrial leadership quite naturally has been concerned primarily with the development of material things, rather than with developments in social philosophy. If one has lagged behind the other, it is not due either to stupidity or dishonesty on the part of the management. If there is any lag in industrial leadership, it results from slowness to appreciate that people have a new social and political outlook. In recent years people have been stirred to expect more out of life than they have been able to achieve before. They want security against old age and unemployment. They want at all times and in every trade a fair day's pay for a fair day's work. They want reasonable working hours. They want a generally higher standard of living. Here you will find some of the roots of the problem of industry's public relations today.

Public discontent with things as they are is not a phenomenon new to our generation. The advantage which industry has today in dealing with these conditions, however, is that industry has at its disposal the same instruments of approach to the public now being effectively used by the well-known pressure group which seem so successfully to capitalize on public opinion to their own benefit.

One of the most effective things done in the last Presidential campaign was a constant testing of public opinion and public interest in various subjects of then current discussion. Soundings were made as to the relative importance of these subjects in the news of the day. Observations were made of the changes from week to week—the growth or decline of interest concerning specific subjects, as well as the indicated attitude of the public toward them. If industry is to be successful in dealing with public opinion—which is the goal of public relations and publicity—it must learn the language of the people, it must consider the study of public opinion as important as any phase of its operations. It must recognize that public opinion can be measured, and utilize the increasingly scientific methods developing today for gaging it.

Management today is called upon to conduct the affairs of business under restrictions and requirements, actual and potential, which sometimes it regards as both irritating and unnecessary. When a public official speaks, people applaud; when management speaks, the public has its tongue in its cheek. Public confidence to a substantial degree is being transferred from industry to Government.

What can management do about it? First, it can review the progress of governmental regulation of business and finance in the past, and look at the events which produced it. It can compare the economic and political developments in this country and similar developments in other parts of the world, especially since the war. Second, management should prepare itself to accept and put into practical application a few simple essentials to the successful conduct of private enterprise:

(a) That since business has nothing to sell except merchandise or service, management's first task is to see to it that the capital invested produces a maximum of useful goods or services.

(b) That the product of capital must be sold at a minimum of reasonable profit.

Third, management must realize that its constituency is the public as a whole; that it must win the confidence of labor, of agriculture, of the man in the city office, the man in the factory, the man on the farm, the worker, the stockholder, the customers, and the public at large. Management must organize to take them into its confidence.

Abstracted from a talk "Public Relations in Industry" by T. J. Ross, of Ivy Lee and T. J. Ross, New York, and presented at the sixteenth annual general management meeting of the American Management Association June 3, 1937.

Why Did the Gudgeon Pin Plug Blow Out?

FRANCIS W. SHAW
Whitworth, England

In order to soften a hardened hollow gudgeon pin, the pin was placed end up and a brazing torch applied. After the pin had attained a red heat, a deafening explosion occurred. An examination disclosed that the upper plug by which the hole had been sealed had blown

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out. A small hole in the plaster and lath sealing 5 ft. above gave evidence of the severity of the force that had expelled the "bullet."

What was the cause of the explosion is the question that arises, for it is difficult to conceive of the mere expansion of air giving rise to force so enormous. It is likely that oil, inserted to ease entering the plug, had gasified and, mixed with the air in the hole, had exploded.

The creator of this incident, or accident as it might well have been, upon mentioning the matter to an automobile repairer, learned of a similar explosion attendant upon the heating of a pin in position in the piston. Other readers may have a satisfactory solution.

Auxiliary Hoist Saves Overhead Crane Time

The Seaman Body Plant, Milwaukee, found that its 40-ton overhead crane was called upon to handle dies

weighing less than 5 tons during 80 per cent of the lifts. There were two disadvantages: First, the lifting speeds, while sufficient for heavy pieces, were uneconomical when moving and placing lighter loads; second, there was a waste of electrical energy by operating the crane on only a small portion of its capacity. To remedy the situation, a P&H 5-ton hoist was installed next to the crane hook. Control of the hoist, which has a variable-speed unit, is done from the crane cab in the same manner as though it were an auxiliary crane hook. The hoisting speed is 35 ft. per min. which is suitable for the light loads handled.

The Rolling Tradition

The man who first applied the idea of finishing axles and crankpins by rolling has much to answer for. While the process was doubtless an advance at the time, it has become a tradition and a stumbling block in too many places. Rolling undoubtedly makes the metal more dense at the surface and adds to the fatigue strength of the axle. But it is safe to say that no rolled axle is round within from 0.002 to 0.005 in. This has been proved conclusively by putting a rolled axle in a grinder and grinding the rolled surface.

Grinding axle journals and wheel fits is standard practice in many railroad shops in Europe. The Germans have a planetary grinding machine that finishes crankpin bearings after the pin is in place; it also grinds the bearings of crank axles.

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Dealing With the Dealer

JOHN R. GODFREY

Old Man Johnson was just home from a trip when I last saw him. He'd been visiting some old cronies who are still active and came back with some interesting stories. This one interested me for several reasons.

"You know Godfrey I've never had much use for selling agents or dealers. I always rather admired the machine builders who sold their own stuff. And I'm not saying it hasn't advantages. But there's another side to the story.

"One of my old pals runs a good sized railroad shop. Like most of 'em it needed a lot of new machinery. And one day the big boss nearly gave him heart failure by asking for a list of tools he needed and what they'd cost.

"After Bill got over the shock he started in to check up on his equipment and the best he could do to bring his shop anywhere near up to date was $68,000. Then it was the big boss's turn to holler for help. The upshot was that he told Bill he could have $36,000 and not a derned cent more. And was Bill in a pickle?

"He'd listed his new machines so as to give him a good line of operations. If he bought only half the machines he wouldn't be much better off than before because the old tools would crab the game. Then he got a bright idea. He called one of his pals who was a machinery dealer and asked him to call for a confab.

"They went over the new layout together and decided the machines listed were O.K. But they just couldn't be had for that money. They also checked up on the machines that were to be chucked out. Most of them were junk, only good for the cupola. But a few could be useful in some small shop at a price.

"Bill," says the dealer, "you've got to change your ideas a bit. You've listed all new machines, and good ones. If money was no object I'd say go to it. I'd like to sell 'em to you or see you buy them direct where I couldn't. But here's another angle. Some of these machines don't need to be of the latest design. You don't manufacture on a highly competitive basis. You can afford to pay a dollar more for labor if you can save five in machine overhead. In other words, buy some good used machines for work where they will do the job in good shape."

"Bill hesitated, Godfrey. He liked new machines with all the latest trimmings, same as we all do. Then he remembered that $36,000 wouldn't buy all he wanted. But the upshot was that he made a deal with the dealer—no puns intended Godfrey—and got a line of machines that fixed him up pretty well.

"The dealer allowed what he could for the old machines that were usable. Then he found some used machines that had been rebuilt, or reconditioned, or whatever you want to call it that would handle certain jobs in good shape. Some machines, which came nearest to being on production, were bought new. And those rebuilt machines were in mighty good shape Godfrey. Some one had done an honest-to-goodness job on 'em.

"Bill is tickled pink. So is the big boss. Bill feels that the dealer is a sort of broker, or consultant, who can help most anyone situated in his position. He's likely to call his friend again if he gets any more money to spend."

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TOLEDO—Cornell Supply Co.
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TORONTO — Canadian Fairbanks-Morse
TROY, N. Y. —Fred K. Blanchard
TULSA—Mach. Tool & Sup. Co.
VANCOUVER, B. C.—Crossman Machinery Co., Ltd.
WORCESTER, MASS. — Waite Hdw. Co.
YORK, PA. — York Machy. & Supply Co.

Machine Tools and Industry

One of the major problems in industry today pertains to the production obtainable from machine tools. There are so many problems and so many solutions in manufacturing that industry cannot decide on any one method, but must keep its mind open at all times for suggestions and constructive criticisms that are continually offered by machine tool dealers and builders. It is up to industry to select those that fit into its requirements best and to take full advantage of the economies that are possible.

It is interesting to note that tailor-made products in industry usually require standard machine tools while standard products frequently require special machines. By special machines, is meant units that are not universally applied to similar manufacturing operations. As an example, large machines such as turbines, turbo-generators and other large apparatus must be designed and built to the customers' specifications and require, almost entirely, general purpose machine tools for their manufacture. On the other hand, such items as small motors, household appliances, automobiles and other units made in large quantities require machines especially designed for particular operations. Undoubtedly developments in these special machine tool applications have helped materially in the design and application of most of the standard machine tools.

The most expensive item in any industry is handling time. A number of industries have made checks of this item and have found that handling time in an average manufacturing plant ranges from 50 to 80 per cent of the production time. This is one of the things that the machine tool industry should consider carefully. It applies to machine tool applications in general purpose manufacturing as well as in high production applications. Much has been done to provide suitable stops and controls, but further study of this problem is necessary. Consideration should be given to fixtures and holding devices.

Industry has many installations where one operator runs several machines. Much criticism has been received from labor on this account. Either the situation must be made less fatiguing or some other means devised to eliminate lost time. Automatic machines are used wherever possible but their applications are limited to high production operations.

A machine tool can be built to have plenty of ruggedness, a large range of feeds and speeds, but if these things are not suitable for the cutting tool, much of the development and the operating efficiency is lost. It seems to me that the machine tool dealers and manufacturers should work closely with the tool development problem.

Abstracted from an address delivered by J. R. Weaver, director, equipment, inspection and test, Westinghouse Electric & Mfg. Company, before the Associated Machine Tool Dealers at their recent annual meeting.

Valveless Engine

An internal combustion engine with no valves of the conventional type is reported to have been developed by F. M. Aspin of Bury, Lancashire, England. Its weight is said to be one-third that of the average engine of the same horsepower. Gasoline consumption is reduced one-half.

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TRADE PUBLICATIONS

AIR CONDITIONERS "Central System Air Conditioners" is the title of a 32-page booklet offered by Fairbanks, Morse & Co., 900 South Wabash Ave., Chicago.

BEARINGS Precision ball, roller and thrust bearings are listed in an 84-page catalog, No. F-958, issued by Norma-Hoffman Bearings Corp., Stamford, Conn. It includes tabulated data on sizes, dimensions and load ratings of 108 distinct series of bearings, embracing over 3,000 sizes.

BROACHES A four-page folder describing the use of "Naloy" steel for broaches and form tools has been published by National Broach & Machine Co., Shoemaker & St. Jean, Detroit, Mich.

BROACHING External and internal broaching set-ups developed by National Broach & Machine Co., Shoemaker and St. Jean Sts., Detroit, Mich., are described in a new four-page bulletin.

CASTINGS FOR ENAMELING A handbook known as "Production of Castings for Porcelain Enameling" has been published by the Porcelain Enamel Institute, 612 North Michigan Ave., Chicago. Included in the booklet are a number of illustrations.

CERROMATRIX A 24-page booklet describing the use of "Cerromatrix" alloy for locating blanking, piercing and trimming punches in relation to dies without the need of machining non-working surfaces to close dimensions, is offered by Cerro de Pasco Copper Corp., 44 Wall St., New York.

COUPLINGS Continental-Diamond Fibre Co., Bridgeport, Montgomery Co., Pa., has announced publication of a 4-page technical bulletin covering "Celoron" molded-sprocket couplings. These flexible couplings are available in seven standard sizes.

COUPLINGS "Rybeck" flexible couplings are listed and described in Bulletin No. 179 announced by The T. L. Smith Co., 2835 N. 32nd St., Milwaukee, Wis.

CRANES Folder, Form No. G-437, published by the Cleveland Crane and Engineering Co., Wickliffe, Ohio, illustrates various applications of tramrail cranes and transfer bridges in industrial plants.

DIESEL ENGINE LUBRICATION No. 4 of Vol. 1 of the "Panorama of Lubrication" series published by Shell Petroleum Corp., St. Louis, Mo., deals with the principles of diesel engines and discusses operating problems that affect lubrication.

DRILL CHUCKS Standard drill chucks and tap holders that grip the tools without the aid of bushings are described in a folder offered by Alco Tool Co., Bridgeport, Conn. Prices are listed.

FURNACES Surface Combustion Corp., Toledo, Ohio, offers a 16-page booklet, Form No. SC-82, with the title "SC Gas-Fired Furnaces in the Automotive Industries." Illustrations show outstanding installations of these furnaces.

GEARS "Red Ring" equipment for shaving, lapping, checking and sound-testing gears is shown and described in five bulletins announced by National Broach & Machine Co., Shoemaker and St. Jean Sts., Detroit.

GEAR MANUFACTURE "Modern Methods of Gear Manufacture" is the title of a 46-page booklet announced by National Broach & Machine Co., Shoemaker and St. Jean Sts., Detroit, Mich. Considerable

Winners

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practical data are included, such as: spur and spiral gear formulas, corrections for gear-tooth calipers, heat-treatment of gear steels, forging practice and principles, machinability, and production equipment and technique.

GEAR DESIGN The National-Erie Corp., Erie, Pa., is now offering a "Standard Procedure in Determining the Size and Horsepower Capacities of Gears of Different Materials" by J. E. Katzenmeyer, mechanical engineer. This is Bulletin No. 3.

GENERATING SETS Bulletin No. 3600-A2, announced by Fairbanks, Morse & Co., 900 South Wabash Ave., Chicago, illustrates the construction and application of Model 36-A Diesel generating sets, designed for use in industrial plants.

GREAT BRITAIN The Travel and Industrial Development Association of Great Britain and Ireland, 620 Fifth Ave., New York, has announced publication of a 48-page industrial hand book giving many facts about the British market.

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HEAT TREATING "Heat Treating Steels with Du Pont Cyanides and Salts," offered by The R. & H. Chemicals Dept., E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., is a 36-page manual for metallurgists and steel treaters. Tables of useful information are included.

HERCULOY A 62-page booklet, announced by Revere Copper and Brass, Inc., 230 Park Ave., New York, gives much data regarding Herculoy copper-silicon-tin and copper-silicon-manganese alloys for structural and engineering uses.

HOISTS Type H "Hi-Lift" electric hoists, available in six capacity ratings, are described in Bulletin No. H-101, offered by Northern Engineering Works, 210 Chene St., Detroit, Mich.

INSULATIONS "Barriers to Industrial Waste," a 68-page booklet published by Johns-Manville, 22 East 40th St., New York, N. Y., describes in detail more than 50 different insulations for all types of heated or refrigerated equipment. A section deals with the new type 2,000 F. insulating brick.

LACQUERS Product summaries concerning two of its lacquers are available from the Roxalin Flexible Lacquer Co., Inc., Elizabeth, N. J. These product summaries concern Tarnish Proof Lacquer No. 4527, a high mar-resistant finish for brass and silver, and Outdoor Lacquer No. 4917, a brass and silver lacquer for outdoor exposure.

LATHE GRINDER The No. 12 "Chief" lathe grinder is described in a 2-page bulletin offered by The Dumore Co., Racine, Wis.

LAPPING COMPOUNDS The "Red Ring" oil-soluble and water-soluble lapping compounds, suitable for gear lapping operations, are listed and described in a bulletin offered by National Broach & Machine Co., Shoemaker & St. Jean Sts, Detroit, Mich.

LIFTING-MAGNET CONTROLLERS The Electric Controller & Mfg. Co., 2716 East 79th St., Cleveland, Ohio, offers a four-page bulletin describing the automatic-discharge type controller for high-speed lifting magnet operation.

LIMIT SWITCH The two-circuit cam-operated track-time limit switch is described in Bulletin No. GEA-1285A offered by General Electric Co., Schenectady, N. Y.

MAGNET BRAKE A Bulletin No. GEA-2443A, announced by General Electric Co., Schenectady, N. Y., describes details of the three-shoe d.c.

magnet brake that is available for six pulley sizes.

MOTOR STARTERS A 4-page bulletin announced by Allen-Bradley Co., 1311 S. First St., Milwaukee, Wis., illustrates industrial applications of solenoid-type motor starters.

PACKINGS The eleven most commonly used U. S. packings are featured in a catalog booklet compiled as a substitute for the larger and more comprehensive packing catalog issued by the Mechanical Goods Div., United States Rubber Products, Inc., 1790 Broadway, New York, earlier this year.

PIG IRON The American Iron & Steel Institute, 350 Fifth Ave., New York, N. Y., has issued the first of a series of pamphlets on a projected steel products annual. This first section gives definitions of pig iron and ferro alloys. Single copies cost 15 cents.

PUNCHING UNITS Hydraulic self-stripping punching units, manufactured by Progressive Welder Co., 737 Piquette Ave., Detroit, Mich., are described in a 4-p. folder. It is claimed that these units can be located to pierce holes from various angles at one operation.

ROTARY FILES Hand-cut rotary files, available in either high-speed or carbon steel, are shown in a four-page bulletin, No. 105, offered by M. A. Ford Mfg. Co., Davenport, Ia.

SALT TABLET DISPENSER Bulletin No. FA-57, issued by Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh, Pa., describes the Salt Tablet Dispenser, designed for use in industry where hot working conditions exist.

SQUARING SHEARS Series HL power squaring shears, built in 6 to 12 ft. cutting lengths with 10 gage capacity, are featured in Bulletin HL offered by Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.

SHAFTING "Shafting and Shaft Applications" is the title of a 16-page booklet, No. 29, announced by La-Salle Steel Co., Palmolive Bldg., Chicago. Recommendations for the type of steel applicable under different service conditions are included, as are tables of physical properties of the various steels.

TURBINE PUMPS A Bulletin No. 260-B11C, issued by Roots-Connersville Blower Corp., Connersville, Ind., lists and describes turbine pumps for industrial applications.

THRUST BEARINGS Engineering Bulletin No. 101, announced by The Bantam Bearings Corp., South Bend, Ind., lists sizes and types of ball thrust bearings, in sizes from ½ to 3½ in. bore, and roller thrust bearings, in sizes from 6 to 12 in. outside diameter, which are now stocked as a service to industry.

VALVES A Bulletin No. GEA-1569A, announced by General Electric Co., Schenectady, N. Y., shows Thrustor-operated valves for pipe sizes of 1 to 10 in. inclusive.

VALVES A redesigned line of bronze "Flocontrol" valves, manufactured by Hancock Valve Div., Manning, Maxwell & Moore, Inc., 3 Elias St., Bridgeport, Conn., are described in an illustrated 8-page bulletin. Full particulars of design, materials and applications are given.

WRENCHES Industrial drop-forged wrenches and other standard stock specialties, including two new lines of chain pipe tongs, are described in a new general catalog issued by J. H. Williams & Co., 75 Spring St., New York, N. Y.

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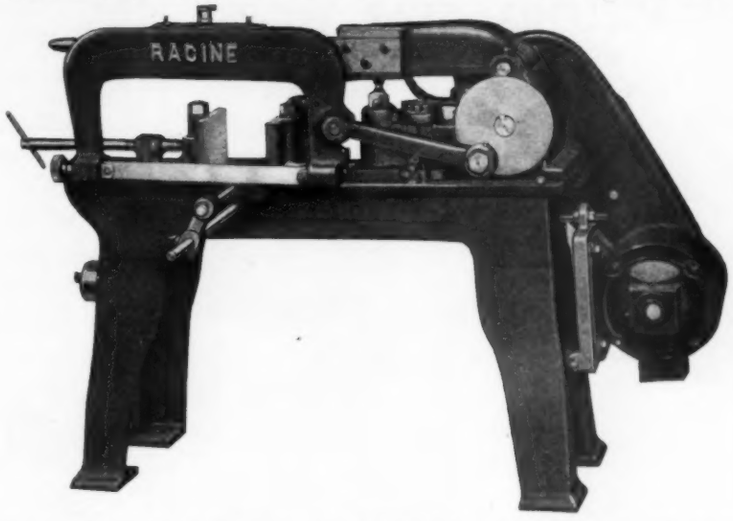
ANNOUNCES

The New RACINE Utility Saw



Here's a low-priced 6"x6" machine that is ideal for the small shop or as auxiliary equipment in the large shop.

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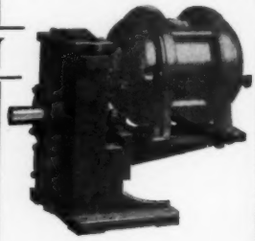

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